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The Refrigeration Service Engineer

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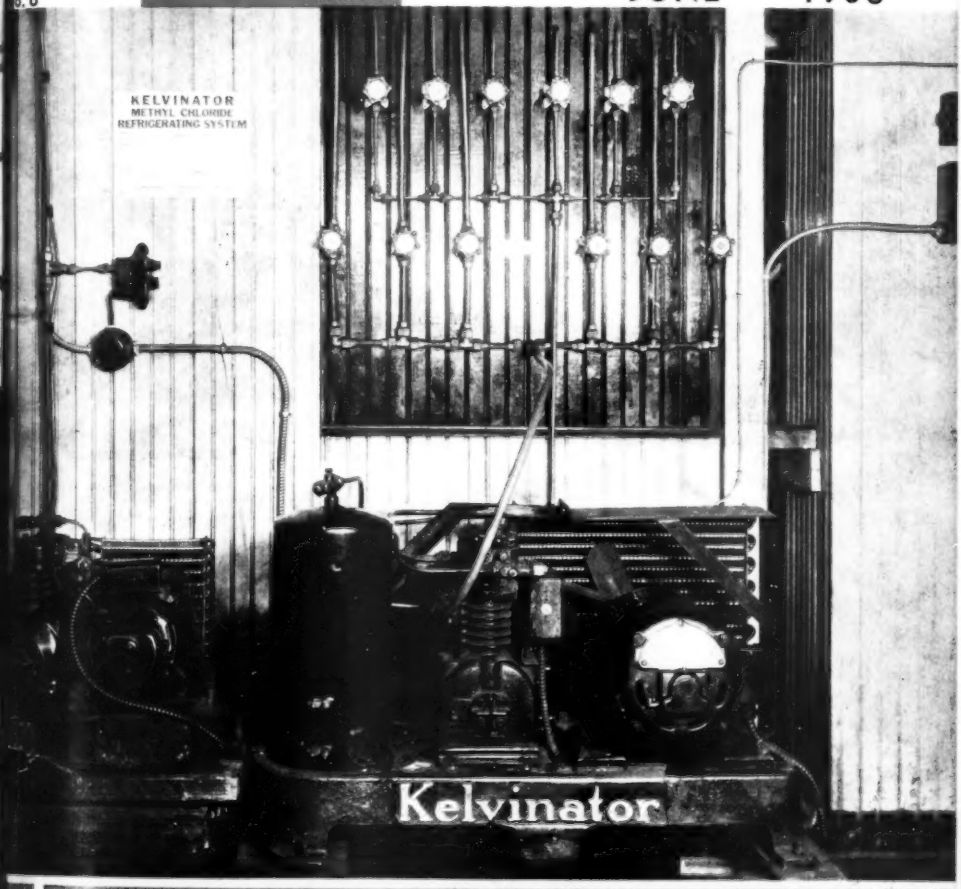
JUNE • 1936



Computing Compressor Capacities • Detailed Construction of Grunow Carrene Compressor • Questions and Answers • Fur Cold Storage

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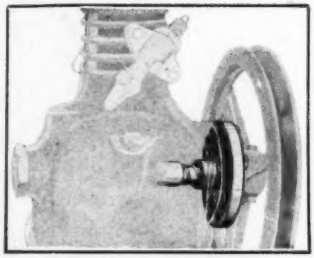

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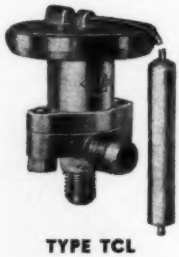

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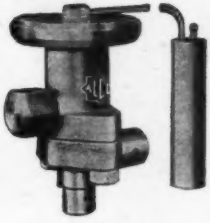

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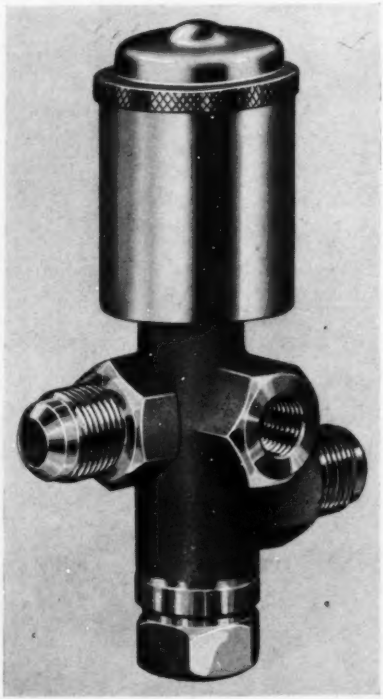
(CONSTANT TEMPERATURE VALVES)



TYPE "M"

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The REFRIGERATION SERVICE ENGINEER

Devoted to the Servicing of

REFRIGERATION UNITS *and* OIL BURNERS

VOL. 4 JUNE, 1936 NO. 6

COVER

AN installation by E. C. Johnson of the Breckenridge Electric Co., Breckenridge, Minn. The coils were made by hand. Detroit Thermostatic Expansion Valve is used. The small compressor operates an ice cube maker, which makes 378 ice cubes at one freezing.

The large compressor refrigerates two bars (the beer bar and the liquor bar) in the Wilkin Hotel. The liquor bar is in an adjacent building to the hotel. Each bar has two bottle coolers and a novelty box.

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The Refrigeration Service Engineer

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

OFFICIAL ORGAN REFRIGERATION SERVICE ENGINEERS' SOCIETY

VOL. 4, NO. 6 CHICAGO, JUNE, 1936 $2.00 per Annum

Cold Storage For Furs

Refrigerated Fur Storage Vault Provides Safe Storage

Refrigerated Vault Maintained at Proper Temperature Provides Only Sure Way to Keep Furs in Good Condition During Hot Summer Months.

A LARGE market for commercial refrigeration installations is opened to the service engineer in the installations of refrigerating equipment for the storage of furs during the summer months.

Refrigerated storage is the safest method known to preserve the luster and life of furs and to destroy any insect life when the furs are held at below freezing temperatures for a certain length of time.

There has been considerable educational activity during the past few years in acquainting the public with the necessity of using refrigerated fur storage vaults. Consequently, an increasing number of refrigeration installations are being made in the smaller community furriers' shops, who recognize that refrigerated vaults are necessary to compete with the larger companies, thereby opening a fertile market for the refrigeration service engineer.

Mr. Willis Stafford, refrigeration service engineer of Warrenville, Illinois, describes a recent fur storage installation which he made.

The storage vault was 10 by 14 feet, constructed of 14 inches of reinforced concrete walls, with four inches of corkboard. The door to the storage vault is a 1½ ton steel bank vault door, with a standard four inch cork insulated refrigerator door on the inside (Fig. 1). The refrigeration equipment (views of which are shown in Figs. 2 and 3) consists of a 1-hp. Frigidaire water-cooled unit, using "Freon" as the refrigerant.

A Carrier diffusion unit is suspended from the ceiling in the center of the vault (Fig. 4). A baffle on the bottom of the unit deflects the air in all directions. A fan driven by ⅛-hp. motor operates continuously. A thermal cut-out switch, mounted on the panel board, is provided for the protection of the motor.

The condensing unit is controlled by two Minneapolis-Honeywell thermostats mounted on the panel board. One of the thermostats

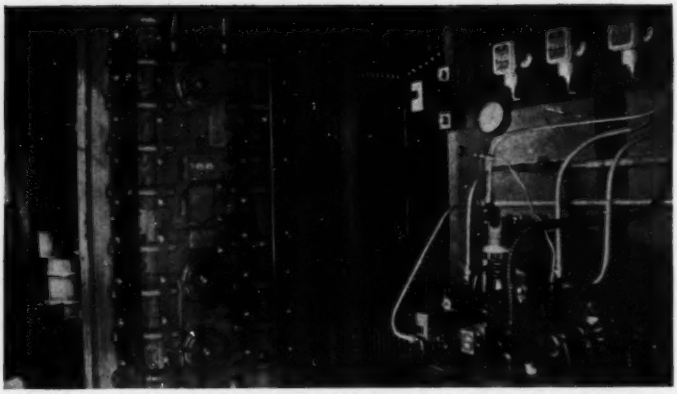
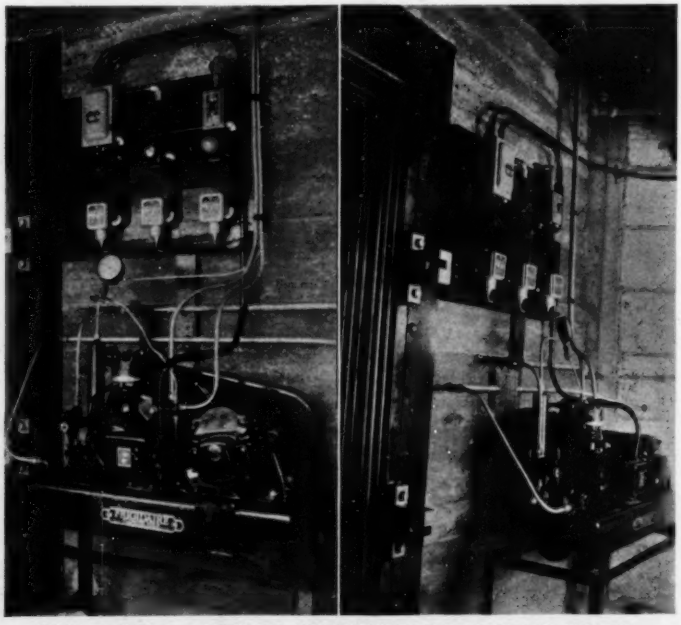


FIG. 1. LOCATION OF FRIGIDAIRE COMPRESSOR SHOWING VAULT DOOR.

is set at 16° to 18° F. while the other is set from 45° to 50°. Another thermostat controls a warning bell, which is set at 60°. Above each of the temperature controls on the panel board is a pilot light which immediately indicates on which thermostat the job is working at that time. In addition to these controls is a manually operated switch to change from one thermostat to the other as the customer desires.

The purpose of the dual thermostats is that the furs can be held at below freezing temperatures for a time when they are first put in the storage vault, and then held at a



FIGS. 1 AND 2. VIEWS OF COMPRESSOR AND CONTROL PANELS.

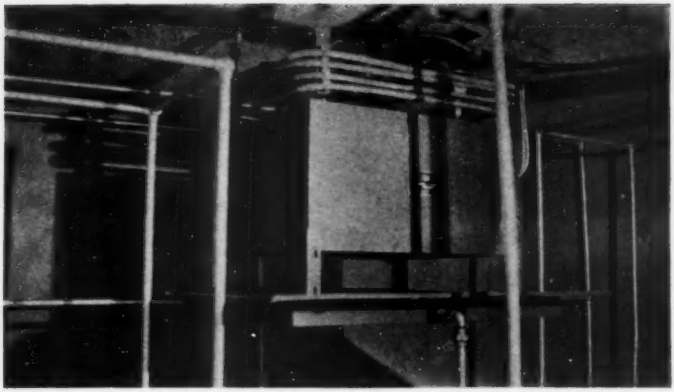


FIG. 4. CARRIER DIFFUSION UNIT IN FUR STORAGE.

higher temperature. The temperature in the storage vault is lowered occasionally during the storage period so as to kill any moth life in the furs. The theory is that such life cannot exist where the furs are maintained at below freezing temperatures, and then held at higher temperatures, and the process repeated during the storage period. If the temperatures were held constant, it has been shown that the insects will lie dormant and not be killed. Cold storage only can provide such conditions.

Computing Compressor Capacities

Practical Examples of How to Determine Proper Compressor Capacity for Various Jobs. Methods of Determining Refrigeration Requirements. Condenser Factors. Compressor Volumes.

By L. K. WRIGHT, A.S.R.E.

THERE are many instances where owners of special or expensive ice refrigerators desire the installation of mechanical refrigeration equipment. It is essential that the compressor selected be of proper capacity to carry the load.

While much interest is displayed in the determination of proper compressor size for a specific installation, little data of practical value is available. The material which follows attempts to simplify such calculations and render it an easy matter to select compressors of correct capacities.

It is important that the compressor be of proper capacity. One of excessive capacity results in high first cost, a serious element in competitive sales work, while one of insufficient capacity will result in loss of good will, to say nothing of the cost of rectifying such a condition.

A specific example involving the determination of proper compressor size is given in the following data. By following through, step by step, any similar problem can be worked out.

Ice Drip Test

If the refrigerator is in use check the amount of ice meltage and use it to compute refrigerating load. Where the refrig-

erator is not in use the box will have to be measured, its square feet of surface obtained as well as the thickness and kind of insulation. The heat leakage and total refrigerating load can then be arrived at by calculation.

For our particular problem, let us assume the refrigerator is in use. To check the amount of ice melted place a vessel under the drip line and catch the water for a period of one-half hour. While waiting, the temperature of the room in which the refrigerator is located should be checked and then the thermometer should be left in the central part of the refrigerator for at least ten minutes, to get an average box reading.

Assume the amount of water caught in a half hour test period to be 1 lb. 4¾ oz., while the box temperature was held at 50°, with an ambient or room temperature of 85° F.

Ice Meltage Per Day

Thus, the meltage per hour is twice that of the drippage caught in the test time of ½ hour and the meltage per 24 hour operation is therefore:

2 lb. 9.5 oz. × 24 = 61.25 lb. per 24 hours

The difference in operating conditions during test:

$$85 - 50 = 35° \text{ temp. diff.}$$

The B.t.u. per 24 hour operation with ice is therefore:

$$144 \times 61.25 = 8820.0$$

The B.t.u. per hour per degree F. differential is:

$$\frac{8820}{35 \times 24} = 10.5$$

With machine operation, where a 45° F. refrigerator temperature is desired and it is estimated that the ambient temperature may rise as high as 90° F. during the summer, the extreme operating temperature differential is:

$$90 - 45 = 45$$

The load, with machine under these extreme conditions, is:

$$45 \times 10.5 = 472.5 \text{ B.t.u. per hr.}$$

Refrigerant

As sulphur dioxide is used in the preponderance of household equipment, assume it will be used as the refrigerant in this case and that the low side will be set to operate at a pressure of approximately 6″ Vac.

The temperature corresponding to 5.87″ Vac. (the nearest reading to 6″ Vac.) is 5° F. and this will be assumed to be the operating temperature.

Referring to a table of saturated sulphur dioxide the following data will be observed:

At 5° F. (5.87″ V.) the volume is 6.421 cu.ft. per lb.

Heat content of liquid at 5° F. is 14.11 B.t.u. per lb.

Latent heat of vaporization at 5° F. is 169.38 B.t.u. per lb.

Condenser Factor

Most small units of household size are designed with an air-cooled condenser. Assume this to be the case and that the room or ambient air temperature will be 90° F. Using this as the temperature of the air available for cooling the condenser, refer to the Condenser Factor Chart.

CONDENSER FACTORS

Refrig. Temp. °F. in Evap.	Temp. of Air Over Condenser °F.								
	60	65	70	75	80	85	90	95	100
−15	21	20	20	19	19	18	15	14	13
−10	23	23	22	22	21	20	17	15	14
− 5	26	25	25	24	23	22	18	17	15
0	28	27	26	25	24	23	22	20	18
+ 5	30	29	28	27	26	26	25	24	23
+10	35	34	32	31	30	28	26	25	24
15	38	36	34	32	31	30	27	26	25
20	40	38	36	33	32	31	29	28	27
25	45	42	39	37	35	33	32	30	29
30	48	47	45	42	40	38	36	35	34
35	50	49	48	46	45	44	43	42	41
40	52	51	50	48	46	45	44	43	42

Locate the 90° column under the heading, "Temp. of Air Over Condenser °F." Run finger down this column until on line with the evaporating temperature (+5°) and the number 25 will be found in the box at this point.

This factor (25) must be added to the ambient or room temperature: 25 + 90 = 115° F. Assume this figure (115) to be the condensing temperature.

Refer to a saturated sulphur dioxide table and find:

115° F. = 108.02 lbs. Abs. or 93.32 lbs. Gage

Heat Content of Liquid

Heat content of liquid, at this point (93.32 lbs. gage), is given in a table of sulphur dioxide as 51.93 B.t.u. per lb.

The difference in the heat valve of the liquids in the high side (condenser-receiver) and the low side (evaporator) is therefore:

$$51.93 - 14.11 = 37.82 \text{ B.t.u. per lb.}$$

The true available refrigerating effect per lb. of SO_2 circulated and vaporized is:

$$169.38 - 37.82 = 131.56 \text{ B.t.u. per lb.}$$

Dividing the B.t.u. refrigerator load requirements by the true or net refrigerating effect the number of pounds of liquid to be circulated per hour can be determined; thus:

$$\frac{472.5}{131.56} = 3.591 \text{ lbs. } SO_2 \text{ per hr.}$$

By multiplying the lbs. per hr. (3.591) by the cubic feet of gas at vaporizing conditions (5° F.) the number of cu. ft. of saturated vapor to be pumped per hour by the compressor can be determined, as:

$$3.591 \times 6.421 = 23.058 \text{ cu. ft. per hr.}$$

Gas Pumped per Minute

This theoretical displacement can be changed to cubic inches by multiplying by 1728 and will give the number of cubic inches to be pumped per hour. By dividing by 60, or by combining the preceding problem and canceling, the problem is shortened to:

$$\frac{23.058 \times 1728}{60} = 663.84 \text{ cu. in. per min.}$$

Efficiency of Compressor

The efficiency of a compressor varies with the make, size, design, fineness of construction, cooling surface, age of job, clearance and ratio of compression. It may vary between 50 and 92 per cent. For large, new jobs a higher rating may be taken than for smaller compressors. Efficiency of small, well designed compressors may be taken to vary from 60 to 80 per cent. For general purposes 75 per cent may be assumed for new jobs and 70 per cent for overhauled or used compressors in good condition. For large compressors assume 85 for new and 80 for older jobs.

The theoretical volume (663.84 cu. in. per min.) must therefore be increased to cover this loss in efficiency. The displacement required where a small overhauled compressor is concerned is calculated:

$$\frac{663.84}{70} = 948.34 \text{ cu. in. compressor displacement per min.}$$

Superheat

The return or suction vapor from the evaporator, in passing through the suction line and crankcase, which portions of the system are exposed to room or ambient temperatures, will be warmed or superheated through the absorption of heat from these warm bodies and due to friction.

In the cylinder, due to hot sidewalls, piston, valve plate and compressor head and through the addition of heat by virtue of mechanical work being done on the gas, further superheating occurs.

Superheating will vary with conditions, ranging from 100 to 150° F. for compressors operating with sulphur dioxide, methyl chloride and F-12. Assume about 100° F. on small self-contained systems, as suction lines are usually short. Where other than self-contained jobs are concerned or where a ¼ in. suction line is found, assume 125° F. Normal, self-contained jobs with ⅜ or ½ in. suction lines may be assigned 100° F. in small sizes, small commercial compressors taken at 125° F. and large units at 150° F.

Increase Due to Superheat

Assuming 100° F. as the superheated condition of the gas, refer to a table of superheated sulphur dioxide and find the volume at this temperature. This will be found expressed thusly:

At 10 lb. per sq. in. abs. and 100° F. = 9.389 cu. ft. per lb.

The next available reading is:

At 15 lb. per sq. in. abs. and 100° F. = 6.233 cu. ft. per lb.

Difference in volumes is:

$$9.389 - 6.233 = 3.156 \text{ cu. ft. difference.}$$

Difference in pressure is:

$$15 - 10 = 5 \text{ lb. difference.}$$

The difference in cu. ft. divided by the pressure difference:

$$3.156 \div 5 = .631 \text{ cu. ft. per lb. difference in pressure.}$$

The temperature in which the problem is involved is 50° F., with a corresponding pressure of 11.81 lbs. abs.

The volume of vapor at this working pressure is determined by finding the difference between the working condition and that given in the table. Thus,

11.81 — 10.00 = 1.81 lbs. more than the 10 lb. abs. pressure condition given in the chart.

$$1.81 \times .631 = 1.1421.$$

This figure subtracted from the 10 lb. condition gives:

9.389 — 1.142 = 8.247 cu. ft. per lb.

Increase in Compressor Capacity

The volume of 5° F. saturated vapor (without superheat) was found to be 6.421 cu. ft. per lb. Superheating resulted in an increase in volume to 8.247 cu. ft. per lb. This increase is:

$$\frac{8.247}{6.421} = 1.284, \text{ or } 128.4 \text{ per cent.}$$

The displacement previously estimated without regard to superheating must therefore be increased, multiplying by 128.4 per cent.

948.34 × 128.4 = 1217.66 cu. in compressor displacement per min. If desired, this figure can be divided by 1728 to obtain cu. ft. per min., as:

1217.66 ÷ 1728 = 0.704 cu. ft. per min.

This is the capacity required of the compressor in order to keep the refrigerator at the prescribed temperature (45° F.) under the given conditions (90° F. ambient). Thus, 0.704 cu. ft. or 1217.66 cu. in. of capacity is required per min., where the compressor is permitted to operate a full 24 hours.

Operating Time

It is best to estimate small jobs to operate only 16 to 18 hr. per day, to provide cycling or idle periods. Obviously the compressor must be of larger capacity if the total work is to be accomplished in a shorter operating period.

Assuming a 16 hr. operating period, the compressor displacement should be:

$$\frac{1217.66 \times 24}{16} = 1826.49 \text{ cu. in. capacity per min.}$$

Compressor Volumes

Piston Diameter Inches	Stroke Inches	Displacement Cubic Inches Per Stroke	Displacement at 100 R.P.M. Cu. Inches	Per Min. Cu. Feet
1	1	.7854	78.5	0.0454
1¼	1¼	1.533	153.37	0.0887
1¼	1½	1.840	184.1	0.1065
1½	1	1.767	176.71	0.1023
1½	1¼	2.209	220.9	0.1278
1½	1½	2.651	265.1	0.1534
1½	1¾	3.092	309.2	0.1790
1½	2	3.534	353.4	0.2045
1¾	1½	3.607	360.75	0.2087
1¾	1¾	4.209	420.9	0.2436
1¾	2	4.810	481.0	0.2204
2	1½	4.712	471.2	0.2727
2	1¾	5.495	549.50	0.3179
2	2	6.283	628.3	0.3636
2	2¼	7.065	706.50	0.4089
2	2½	7.854	785.4	0.4545
2¼	1½	5.964	596.4	0.3451
2¼	1¾	6.965	696.50	0.4031
2¼	2	7.952	795.2	0.4602
2¼	2¼	8.946	894.6	0.5177
2¼	2½	9.940	994.0	0.5753
2¼	2¾	10.934	1093.4	0.6326
2¼	3	11.928	1192.8	0.6903
2¼	3¼	12.935	1293.50	0.7485
2¼	3½	13.91	1391.6	0.8053
2½	2	9.82	982.0	0.5682
2½	2¼	11.047	1104.7	0.6392
2½	2½	12.272	1227.2	0.7102
2½	2¾	13.502	1350.25	0.7814
2½	3	14.726	1472.6	0.8522
2½	3¼	15.957	1595.75	0.9234
2½	3½	17.180	1718.0	0.9942
2¾	2½	14.850	1485.0	0.8593
2¾	2¾	16.335	1633.5	0.9459
2¾	3	17.819	1781.9	1.031
2¾	3¼	19.304	1930.4	1.117
2¾	3½	20.790	2079.0	1.203
3	2	14.14	1414.0	0.8188
3	2½	17.675	1767.5	1.022
3	2¾	19.442	1944.25	1.125
3	3	21.21	2121.0	1.227
3	3¼	22.98	2298.0	1.329
3	3½	24.745	2474.5	1.432
3	3¾	26.507	2650.7	1.534
3¼	2½	20.75	2075.0	1.200
3¼	2¾	22.82	2282.5	1.320
3¼	3	24.887	2488.7	1.440
3¼	3¼	26.961	2696.1	1.560
3¼	3½	29.035	2903.5	1.680
3¼	3¾	31.125	3112.5	1.801
3¼	4	32.000	3200.0	1.851
3½	3	28.860	2886.0	1.670
3½	3¼	31.265	3126.5	1.865
3½	3½	33.674	3367.4	1.949
3½	3¾	35.075	3507.5	2.029
3½	4	38.480	3848.0	2.226
3¾	3	33.150	3315.0	1.918
3¾	3¼	35.912	3591.2	2.078
3¾	3½	38.675	3867.5	2.238
3¾	3¾	41.418	4141.8	2.397
3¾	4	44.200	4420.0	2.564
4	3	37.710	3771.0	2.176
4	3¼	40.852	4085.2	2.363
4	3½	43.985	4398.5	2.545
4	3¾	47.137	4713.7	2.727
4	4	50.266	5026.6	2.909
4	4¼	53.407	5340.7	3.091
4	4½	56.565	5656.5	3.273
4	4¾	59.707	5970.7	3.455
4	5	62.850	6285.0	3.637
4½	4	63.600	6360.0	3.680
4½	4½	71.569	7156.9	4.142
4½	5	79.521	7952.1	4.602
5	4	78.560	7856.0	4.548
5	4½	88.380	8838.0	5.114
5	5	98.175	9817.5	5.681
5	5½	108.020	10802.0	6.715
5	6	116.84	11684.0	6.761
6	6	169.65	16965.0	9.818

From the table of Compressor Volumes the compressor interested in can be located, or one of proper size selected. The cubic inches displacement per stroke can be ascertained as well as per 100 strokes from this table.

Selecting Compressor

Assume the compressor on hand, or the one to be selected from a dealer, is a 2 cylinder job, with a 1½" bore and 1½" stroke.

The Compressor Volume Table gives 2.651 cu. in. per stroke for a single cylinder job of this size. A twin cylinder compressor would give—

$$2 \times 2.651 \text{ or } 5.302 \text{ cu. in.}$$

per stroke as the compressor volume.

By dividing the compressor volume into the required displacement, thus:

$$1826.49 \div 5.302 = 344 \text{ r.p.m.}$$

This is the speed at which the compressor will have to operate 16 hrs. per day in order to take care of the specified load. Obviously a single cylinder would have to operate at twice this speed or—

$$2 \times 344 = 688 \text{ r.p.m.}$$

For odd sizes of compressors the displacement per stroke can be found by the following formula:

Diameter, squared × .7854 × stroke.

If 2 cylinders are involved, multiply by 2.

Compressor Speeds

Compressor speeds can generally be altered 50 per cent from the designed speed. If speeded up excessively trouble may result. For instance, bearings and shafts are designed for certain speed and load in a compressor. If overloaded through excessive speed they may give trouble.

Oil holes, eccentrics, counterbalances in single cylinder jobs, valves, springs, gas openings in suction and discharge ports, etc., have been carefully considered by the builder in the original design and were balanced against a certain specific speed.

A compressor operated at or near its designed speed is unquestionably functioning at its highest efficiency. Therefore do not speed jobs up more than 50 per cent of the specified or rated speed. The number of revolutions per minute can be obtained by reference to the maker's specifications.

As a rule small compressors operate at speeds from 250 to 800 r.p.m. Very small single cylinder and a few double cylinder jobs have been turned out to operate at motor speed (1725-1750 r.p.m.) and these direct connected compressors cannot very well be speeded up. In fact, most designs incorporate the motor in such a way that the motor and compressor form an integral unit and in many cases are sealed together in a single housing, forming the semi-hermetic or full hermetic type.

The larger types, such as small commercial and intermediate sizes, generally built double cylinder, operate at speeds up to 700 r.p.m.

By varying the size of the drive pulley on the motor the prescribed speed can be secured. Avoid drive pulleys of small size, as undue wear and slippage will occur.

Water cooled high sides, and especially where compressors are gas or water cooled, operate at low head pressures, depending upon the water supply temperature. Water outlet temperatures should be about 80° F. Gas temperatures may be estimated about 15 degrees above this point.

For rapid estimation of refrigerator loads refer to "Graphic Selector," published in the May issue.

The preceding data, while somewhat lengthy and requiring time to secure material from tables and in calculation, will repay the effort through assurance of proper selection of compressor and will avoid troubles incident to haphazard selection of apparatus.

S S S

Walter Rene,
Missouri.

Enclosed please find $2.00. Kindly renew my subscription. It's worth more.

Kenneth Haskell,
Maine.

Have read and duly absorbed Mr. Wright's excellent article on "The Proper Charge in Air Cooled Units" appearing in the May issue. Now I have used the chart and have the satisfaction of knowing where I am at regarding head pressures. I take this opportunity to tell you the R. S. E. is tops. I would rather lose my compound gauge than any copy of the magazine.

Construction of Grunow Carrene Compressor . . .

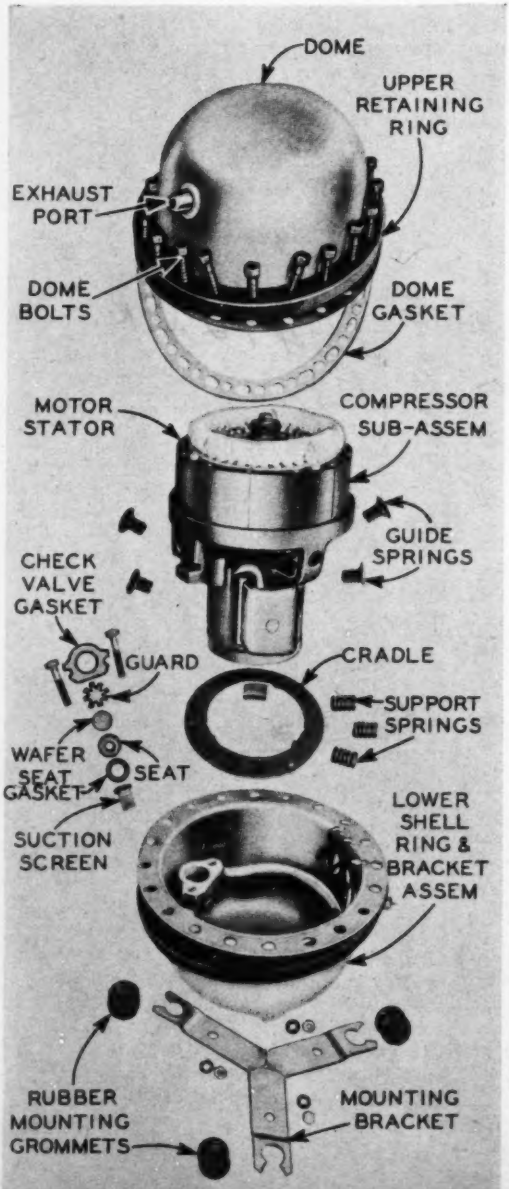


FIG. 1. ASSEMBLY OF GRUNOW CARRENE COMPRESSOR.

Construction Details. Functions of Component Parts. The Compressor Assembly.

THE Grunow refrigerator is manufactured by the General Household Utilities Co., Chicago, Ill., and is the only domestic refrigerator using Carrene as the refrigerant.

This article describes type "M" and "R" units used in Models 50M, 51M, 58M, 61M, 67M, 70R and 82R.

Grunow Carrene Compressor

The compressor used in the Grunow refrigerator is of the rotary type having four vanes spaced equidistant around the rotor. The vanes are all set at an angle of approximately thirty degrees from being radial. The compressor rotor, the vanes, and the motor rotor all revolve as one unit and constitute the only moving part in the entire compressor unit assembly.

According to the manufacturer, the vanes not being radial eliminate undesirable features:

1. The force with which the vanes exert themselves against the compressor body is reduced, minimizing friction, heat, and wear.

2. The vanes always have a tendency to be forced backward in their slot toward the center of the compressor rotor, and actually do recede before stalling the compressor from too great a load.

3. Upon starting, the compressor has no load until the motor has gained enough speed to force the vanes outward against the compressor body to take up their load. This feature makes possible the use of a smaller motor.

4. The vane faces are ground so that the vanes rock on the compressor body once during each revolution of the rotor, eliminating any possibility of excessive local wear, on either the compressor vanes or

body, and actually improve the face of the vanes with use.

The compressor and motor assembly in the Grunow refrigerator is supported on a cradle, resting on three coil springs in the base of the compressor shell. These three springs, together with four coil springs spaced equally around the main frame and supported by the sides of the compressor shell, absorb the inertia effect produced by the instantaneous start of the Grunow motor and compressor, eliminating the noise which would otherwise be produced, transferred to the compressor shell, and be amplified. The entire compressor unit assembly rests on the unit mounting board by means of three legs having molded rubber feet to absorb any motion that might produce noise.

Compressor Oiling System

A positive pressure type of oiling system is incorporated in the Grunow Carrene compressor. Two paths of oil circulation being used, one to lubricate the main frame bearing and the other to lubricate the compressor vanes, body, and rotor.

In the operation of the compressor rotor and vanes, when one of the vanes is passing over the suction side of the body, a lower pressure is produced in the vane slot, back of the vane, than in the bottom half of the compressor shell where a reservoir supply of oil is stored, entirely submerging the compressor body cap. Because the pressure in the base or lower half of the compressor shell is greater, oil is forced through a hole provided in the cap, into the low pressure area in back of the vane. The vane slot soon passes over this hole, and on toward the compression side of the body, where the vane is forced backward into the slot, putting the oil there present under a higher pressure, forcing it out between the vane and vane slot of the rotor, between the ends of the compressor rotor, cap, and frame, and also into a spiral groove in the main frame bearing, directly connected to the vane slot, when the rotor is in this position. The oil travelling in the spiral groove of the main frame bearing lubricates the two main bearing sleeves of the compressor rotor; at the same time, the oil is being pushed out

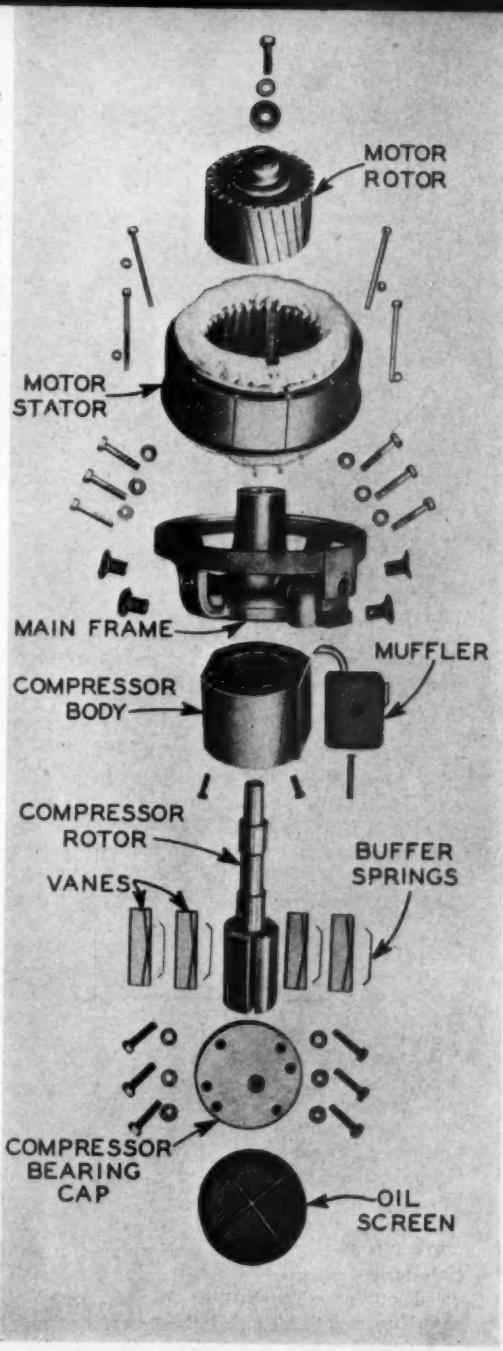


FIG. 2. MOTOR AND COMPRESSOR ASSEMBLY.

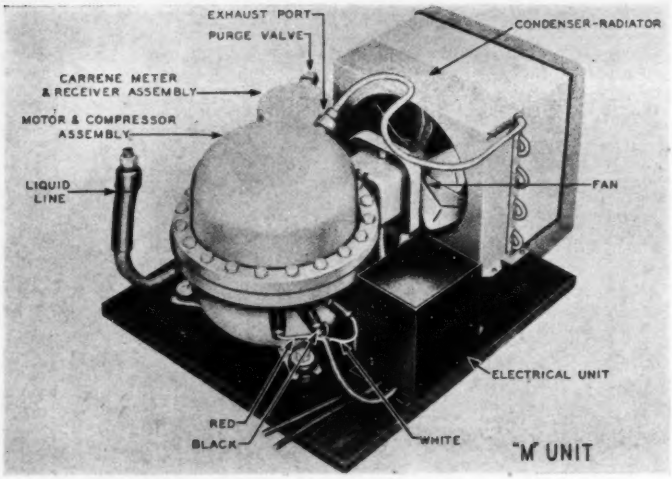


FIG. 3. MODEL "M" GRUNOW UNIT.

the top end of the bearing to return to the oil reservoir in the base of the compressor shell. To prevent the oil pressure from becoming too great in the spiral groove of the main frame bearing, a relief hole is provided at the base of the groove.

The oil forced out between the vanes and vane slots and the ends of the compressor rotor is carried around by the vane tips, lubricating the entire inside of the compressor body. When the oil reaches the exhaust port, the larger portion is discharged into the muffler with the Carrene vapor. From the muffler the oil is returned to the reservoir in the base of the compressor shell to again start its path of circulation.

Condenser-Radiator

The flow of air caused by the action of the electric fan is directed by the condenser-radiator shrouds over the finned tubes of the condenser-radiator cooling them. They in turn cool and condense the Carrene and oil vapors coming from the compressor assembly.

Dehydrator-Meter-Receiver

The dehydrator contained within the dehydrator-meter-receiver is filled with activated alumina which has the property of absorbing more than one-fifth its own weight in water. A screen is provided at the top of the vertically mounted dehydrator as well as at the liquid inlet to the dehydrator to prevent the loss of any activated alumina.

The end of the Carrene metering tube located at the bottom of the dehydrator-meter-receiver is entirely inclosed within a "dutch-mesh" screen to prevent any foreign material from entering and clogging the metering tube.

The receiver in addition to containing the dehydrator and metering tube, acts as a reservoir for Carrene liquid and vapor, and is used to purge the air from the refrigerating system whenever any is present. Carrene vapor being three times heavier than air, settles to the bottom, leaving the air to be pushed out the purge core opening at the top of the receiver whenever the pressure inside the receiver is greater than the pressure outside of the receiver.

Evaporator Shell Assembly

Fig. 5 shows the evaporator shell assembly with its oil return, thermostat bulb clamp, shelves, ice cube tray lifters, and hanger brackets. The evaporator is composed of an inner and outer shell of copper, embossed with tubes and welded together, having a header on top for the storage of liquid Carrene in addition to the Carrene in the tubes. The upper part of the header

acts as a reservoir for the Carrene vapor and contains one end of the suction line.

The liquid Carrene returned from the unit enters the evaporator at the bottom rear center through a tee fitting, which diverts the entering Carrene supply into two main feeder tubes embossed in the outer shell. This liquid Carrene being warmer than the Carrene in the evaporator, and therefore less dense, travels up each side of the evaporator, agitating the Carrene liquid, and freeing it of the entrapped Carrene vapor, allowing the vapor to rise to the top of the header so that it may be removed by the action of the compressor.

Suction and Liquid Line Tubes

Both the suction and liquid line tubes used in the Grunow refrigerator are of extra large internal diameter and are covered with rubber tubing to improve the operating efficiency of the refrigerator. The large size copper tubing is used to eliminate any efficiency losses due to pressure drops and the rubber tubing as an insulation to external heat. The loop at the top of the liquid line before entering the evaporator prevents the liquid Carrene from leaving the evaporator and producing any refrigeration in the liquid line outside of the food compartment.

Evaporator Oil Return

In the normal operation of the compressor, a portion of the lubricating oil is vaporized and carried along with the Carrene vapor from the compressor into the condenser radiator, where it is liquefied and mixes thoroughly with the liquid Carrene and is carried to the evaporator. This oil is of no use in the evaporator and should be returned to the compressor. This is accomplished by having the Carrene oil mixture pass through a coil of small tubing located outside of the evaporator on the upper right hand side which is the warmest location inside the food compartment, as warm air is less dense than cold air and rises. While the Carrene oil mixture passes through this coil of tubing, the Carrene is vaporized, leaving only the liquid oil. As the Carrene vapor and liquid oil leave the coil, they pass over the open end of the suction line, the oil dropping into the open end and being returned to the compressor assembly.

Thermostat

Fig. 6 shows the thermostat with its case cover removed so the entire mechanism may be seen. This thermostat has four major features which are very important for the proper operation of the Grunow Carrene refrigerator.

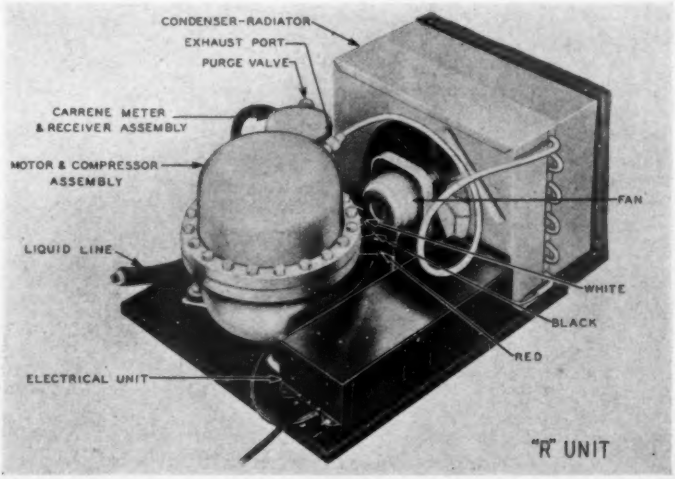


FIG. 4. MODEL "R" GRUNOW UNIT.

1. The start and stop button, which when pushed in makes contact between two pairs of silver contact points and when pulled out breaks the contact.

2. The overload trip or motor protector, which automatically breaks the contact between the silver points, stops the flow of electricity in the electrical system, and protects the motor and electrical unit from any possibility of damage whenever too much current is passed through the electrical system from too great a load on the motor, the wrong line voltage (either too high or too low), the wrong type of electrical supply, or any other trouble that might develop. The start and stop button need only be pushed in again to close the electrical circuit. The excessive current, only having melted a solder release which rehardens when the electricity is off for a short period of time.

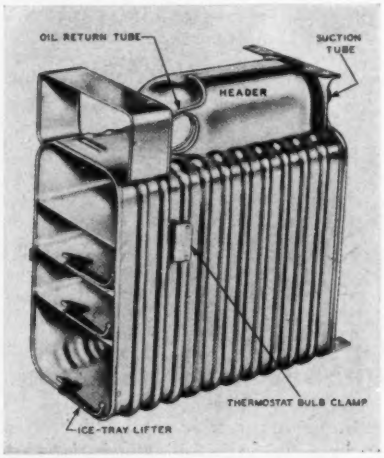


FIG. 5. EVAPORATOR SHELL ASSEMBLY

3. The thermostatic control, which automatically makes and breaks the contact between the silver points, starting and stopping the refrigerating unit whenever necessary to maintain the desired food compartment temperature. The bellows contained in the thermostat case is connected by means of a small tube to the thermostat bulb, which is in direct contact with the side of the evaporator. As the evaporator cools, the gas in the thermostat bulb contracts reducing the pressure in the bellows, allowing it to collapse and open the silver contact points, stopping the refrigerating unit. As the bulb becomes warmer with the evaporator, the pressure in the bellows increases, expanding the bellows until the silver contacts again close and start the refrigerating unit.

4. The temperature selector is operated by turning the temperature control knob.

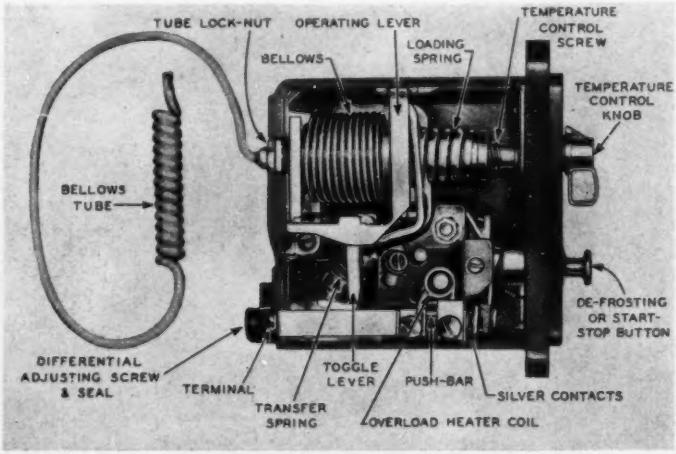


FIG. 6. THERMOSTAT WITH CASE COVER REMOVED

Turning the knob in one direction increases, and in the other direction decreases, the pressure of the spring on the bellows changing the temperature operating range and allowing any desired food compartment temperature between a defrosting and rapid freezing temperature.

Model "M" Electrical Unit and Motor

The model "M" electric motor is designed to operate on a line voltage of 90 to 130 volts and from 50 to 60 cycles alternating current. The motor is a single phase capacitor start type, and for the purpose of starting, temporarily acts as a two phase motor by having an 80 mfd. electrolytic condenser connected in series with the capacitor or starting winding incorporated in the motor stator in addition to the main or running winding.

When the thermostat circuit is closed, the line voltage is connected to the main winding through a relay coil. The current required to start the motor lifts the relay plunger by means of the relay coil, closing the capacity or starting circuit, allowing the electrolytic condenser to be charged and discharged 50 to 60 times per second depending upon the alternating current frequency. This current from the condenser travels through the starting winding of the motor as one phase, and the line current through the running winding as the second phase, starting the motor.

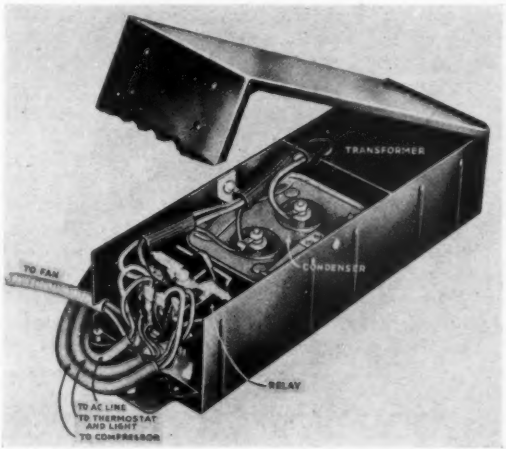


Fig. 7. The electrical unit may be removed by unscrewing the hex nut at the front of the unit and pulling the box forward. To remove completely unsolder the leads at the terminals.

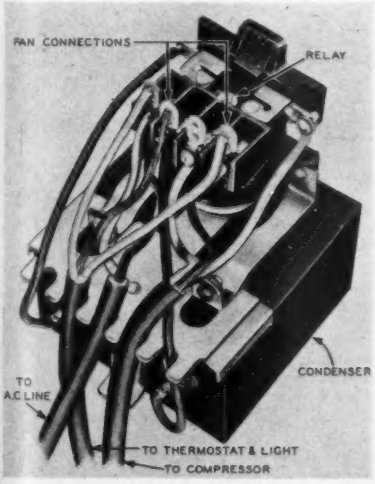


FIG. 8. WIRING CONNECTIONS FOR THE GRUNOW.

As soon as the motor reaches approximately 1800 revolutions per minute, the starting current in the relay coil is reduced sufficiently to allow the relay plunger to drop, opening the capacitor circuit, the motor continuing to run on the main winding only as a single phase motor.

The electrolytic condenser, relay, relay springs and mounting bracket along with the metal cover constitute the model "M" electrical unit box assembly.

Model "R" Electrical Unit and Motor

The model "R" electric motor starts in primarily the same way as the model "M," except a 5 mfd. aluminum foil paper condenser submerged in oil and vacuum sealed in a metal container is used connected across an auto-transformer, in place of the 80 mfd. electrolytic condenser made use of in start-

ing the model "M" unit. With the relay plunger in the up or starting position, the transformer taps are so connected as to impose about 525 volts (with a line voltage of 115 volts) across the 5 mfd. condenser to produce an effective capacity of about 100 mfd.

When approximately 1300 revolutions per minute are reached by the motor and the relay plunger drops to the running position in the model "R" unit, a different tap of the auto-transformer is connected to the capacitor winding. This time about 300 volts (with a line voltage of 115 volts) is imposed across the 5 mfd. condenser, giving the effect of a 20 to 30 mfd. condenser in series with the capacitor winding of the motor whenever it is running. This capacitor effect causes the model "R" motor to operate as a polyphase induction motor increasing the efficiency, power factor, and quietness, which are all desirable to the customer and power company.

The transformer permanently sealed in a steel box containing the 5 mfd. condenser, model "R" relay, and mounting springs together with a removable cover and front piece comprise the model "R" electrical unit box assembly. The high voltage produced by the transformer is applied only across the 5 mfd. condenser and never enters the motor stator or relay, and thus, is always confined within the steel electrical unit box assembly where it is safe.

Fan

The fan is powered by its own motor which requires, approximately only twenty-five watts and is lubricated by a lifetime supply of oil sealed in the fan assembly housing. The fan is used to create a flow of air between the finned tubes of the condenser-radiator, increasing its efficiency. The flow of air then passes the fan motor and compressor assembly, cooling them, the heated air passing out the air duct at the rear of the unit compartment and the cooling air entering in front of the condenser-radiator at the base of the refrigerator.

Amended Code Proposed for Chicago Refrigeration Installations *(Second Article)*

This Article Continued From the May Issue, Concludes the Provisions of the Recently Amended Code Submitted to the City Council.

THE first provisions of the new Refrigeration Code for the City of Chicago to be submitted to the city council was published in the May issue.

This article contains the balance of the code as it applies to the small commercial refrigerating machine.

Construction and Installation—General Requirements

SECTION —. All materials used in the construction and installation of refrigerating systems shall be suitable for the refrigerant used and no material shall be used that will deteriorate due to the chemical action of the refrigerant or the oil, or the combination of both.

Every part of a refrigerating system shall be designed, constructed and assembled to withstand safely and without injury the following required test pressures:

Test Pressures in Pounds per Square Inch

Refrigerant used	*Test Pressure*
Carbon Dioxide	1500
Ammonia	300
Dichlorodifluoromethane (Freon)	225
Methyl Chloride	175
Sulphur Dioxide	135
Methylene Chloride	15

For other refrigerants not herein enumerated the Department for the Inspection of Steam Boilers, Unfired Pressure Vessels and Cooling Plants shall determine the test pressure to be applied.

Castings used in the manufacture of compressors and other parts of refrigerating systems shall be of sufficient thickness and close-grain structure to prevent porosity.

SECTION —. *Pressure Vessels.* The material and construction of liquid receivers, shell condensers, shell

coolers, shell evaporators, absorbers and all other pressure vessels used in refrigerating systems shall be in accordance with the American Society of Mechanical Engineers' Rules for the Construction of Unfired Pressure Vessels, Section 8, dated 1934.

Liquid receivers of direct systems used for air conditioning and for multiple dwelling systems, except those using Class 1 non-irritant and non-flammable refrigerant, shall be of sufficient capacity to contain the total charge of refrigerant. Eighty per cent of the net content of shell and tube condenser can be considered as liquid receiver capacity.

Coils: Refrigerant containing parts of coils shall have not less than .034 wall thickness for tubing sizes 5/8" O.D. or smaller. For outside diameters over 5/8" the wall thickness shall be increased in the ratio of the new diameter to 5/8".

Where coils are not constructed of a non-ferrous metal they shall be protected against corrosion by galvanizing or other approved process. All connections shall be welded or brazed. Solder used for brazing shall have a melting point of at least 1000 degrees.

SECTION —. *Piping, Fittings and Valves, Etc.* No refrigerant lines shall be located in any elevator, dumbwaiter or other shaft containing moving objects.

Steel and Iron Pipe

(a) Standard weight steel or wrought iron pipe may be used for working pressures not exceeding 150 pounds for pipe sizes 2" and over.

(b) Extra heavy steel or wrought iron pipe shall be used for all pipe 1½" and under.

(c) Extra heavy steel or wrought iron pipe shall be used for all pipe sizes 2" and over for working pressures exceeding 150 pounds.

(d) Pipe joints may be screwed, flanged or welded. Screw joints shall conform to the American Standard Association pipe thread standard No. B-2-1919. Exposed threads shall be tinned or otherwise coated to efficiently inhibit corrosion.

(e) Flanges may be screwed or welded to pipes. All flange fittings shall be of the recess gasket type. Flange bolts shall project through nuts.

(f) Welds may be made by the fusion process, both acetylene and electric arc. Pipe may be butt end welded by the electric resistance process. All welding shall be in accordance with the standards issued by the Department for the Inspection of Steam Boilers, Unfired Pressure Vessels and Cooling Plants.

(g) No cast metal fittings, except steel, semi-steel, malleable iron or bronze shall be used.

(h) Reducing fittings shall be used for one or more pipe size reductions.

(i) No bends exceeding 10 degrees, made at place of installation, shall be made in standard butt welded pipe. All bends exceeding 10 degrees which shall have a center radius of not less than 6 pipe size diameters shall be not less than extra heavy pipe. Bends shall be substantially circular and free from wrinkles and kinks.

(j) Piping shall be supported to prevent excessive vibration and strain at joints or connections by hangers or braces of solid wrought iron or steel not less than 1 x 1/8 inches cross section. And for horizontal lines, shall be spaced not farther than 8 feet apart.

(k) Seamless steel tubing, if used, shall conform to the thicknesses for standard and extra heavy pipe.

Copper Tubing and Piping

Seamless soft copper tubing may be used provided:

(a) Systems contain not over 100 pounds of refrigerant.

(b) Tubing does not exceed 5/8" in diameter nor is less than thirty-four one thousandths of an inch in wall thickness.

(c) Copper tubing is enclosed in iron pipe or tubing or other rigid metal enclosures, except flexible metal enclosure may be used at bends or terminals if not exceeding 6 feet in length.

(d) No enclosure shall be required for connections between compressor, condenser or other shell type apparatus and nearest riser box, provided such connections do not exceed 6 feet in length and are located within the refrigerating machinery room.

(e) Every opening from or into an enclosed conduit for refrigerant lines shall be free from sharp edges which might injure tubing.

(f) Flared, flanged, or soldered joints may be used in connections.

(g) All valves and fittings except those on the evaporator and compressor and all connections of tubing shall be arranged in or on a metal box or other suitable enclosure and shall be rigidly attached thereto or to the supports thereof. Every such box or enclosure shall have an accessible door or removable cover.

(h) Piping shall be supported by hangers or other supports so as to sustain a weight of 200 pounds applied at the point of support.

(i) Fittings shall be of forged brass or wrought copper.

(j) No tubing joint shall be placed in conduit.

(k) Flexible metal enclosures, where used, shall be constructed of a non-ferrous material.

Hard copper pipe may be used without being enclosed in conduit, provided:

(a) Pipe shall conform to the following thicknesses:

Normal Pipe Size	*Decimal Equivalent of Wall Thickness*
3/8"	.072
1/2"	.072
3/4"	.072
1"	.072
1¼"	.072
1½"	.072
2"	.083
2½"	.095
3"	.109
3½"	.120

Note:—The outside diameter of nominal size pipe is 1/8 inch larger than the pipe size shown above.

(b) Pipe shall be made from copper having a purity of at least 99.90 per cent, as determined by electrolytic assay, silver being counted as copper. It shall be free from cuprous oxide, as determined by a microscopic examination at a magnification of 75 diameters.

(c) Pipe shall have a tensile strength ranging from 36,000 pounds per square inch to not more than 43,000 pounds per square inch, and shall be legibly marked with manufacturer's trade mark and symbol on each length of tubing for the purpose of identification.

(d) Connections shall be made by the sweated type fittings and solder used shall be made of clean, unused metals having a melting point of not less than 400 F. and not more than 500 F.

(e) Fittings shall be of forged brass or wrought copper.

(f) Pipe shall be supported by solid brass hangers spaced not more than 8 feet apart, and hangers so placed that no soldered joint shall be under tension. Vertical risers shall be supported at each floor and at base of riser.

SECTION —. *Valves:* Stop or service valves shall be provided on systems in accordance with the following schedule:

Location of Valves	Class of System A	B	C	D	E	
Compressor or Generator.....	X	X	X	X	X	
Condenser	X	X	Outlet	Outlet		
Liquid Receiver	X	X	Outlet	Outlet	Outlet	
Expansion Coil	X	X	Inlet	Inlet		(See note)
Flooded Evaporator	X	X	X	X	X	
Branch Headers	X	X				(See note)

Where "X" is shown in the above schedule valves shall be provided on inlet and outlet refrigerant connections.

In a Class C and D system having two or more evaporators in separately refrigerated spaces valves will be required on both inlet and outlet of expansion coil. Where branch headers are used on a Class C or D system with two or more evaporators located in separately refrigerated spaces valves shall be required on the inlet and outlet of the branch headers.

Section —. *Safety Devices:* Refrigerating systems normally operated above atmospheric pressure shall be equipped with safety devices according to the following table:

Safety Device Location and Venting	Non-Flammable and Non-Irritant Refrigerants — Class I System Class A	B	C	D	E	Non-Flammable and Non-Irritant Refrigerants — Class II System Class A	B	C	D	E	Irritant or Flammable Refrigerants — System Class A	B	C	D	E
Pressure Limiting Device.....	X	X	X	X		X	X	X	X		X	X	X	X	
Pressure Vessel Relief Device.....	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vent to Atmosphere.....	X					X	X	X			X	X	X	X	
Compressor Relief Device.....	X	X	X			X	X	X			X	X	X		
Hand Operated Relief Valve....	X					X	X				X	X			
Discharge Check Valve.....						X					X	X			
Quick Closing Suction Valve....						X					X	X			

No connection shall be made with the public water supply which will impair the purity thereof. Water used for removing heat from a refrigerating system shall not thereafter be used for drinking purposes. When a regulating valve is used it shall be connected between compressor or condenser and city water supply.

* * * * *

Section —. *Tests:* It shall be the duty of any person, firm or corporation installing refrigerating systems to apply tests to said systems as required by the chief inspector of the department for the inspection of steam boilers, unfired pressure vessels and cooling plants.

Tests shall be made in the presence of an inspector of the department for the inspection of steam boilers, unfired pressure vessels and cooling plants and shall be applied to every refrigerating system, or parts thereof, installed before being put into use.

Provided, however, the department for the inspection of steam boilers, unfired pressure vessels and cooling plants may accept from the manufacturer of a single unit system a certified copy of test report showing that tests of said system, as required by this ordinance, were made at the place of manufacture.

It shall be the duty of every person, firm or corporation installing refrigerating systems, as aforesaid, to notify the chief inspector of the department for the inspection of steam boilers, unfired pressure vessels and cooling plants whenever any system has reached the stage of construction where it is ready for inspection tests.

The testing of every refrigerating system shall include a pressure or vacuum test of the complete piping system preferably with the evaporator installed but valves thereon may be closed to prevent withdrawal of the refrigerant.

Under these tests a partial vacuum of twenty inches of mercury shall be produced within the system and shall be held for a period of at least one hour with no detachable drop.

Every part of every refrigerating system shall be designed, constructed and assembled to withstand safely, and without injury, the required minimum test pressures, (as specified in the Section on Construction and Installation—general Requirements) which shall be applied for the pressure test. These test pressures shall be held by every refrigerating system under test for a period of at least one hour, or over, without any appreciable fall.

Gases to be used for Testing: Pressure tests shall be made with air, carbon dioxide, nitrogen or other inert gas approved by the department. When practical, water may be used. When testing with air, care shall be taken to prevent the temperature at any point from rising above 130° F.

Section —. *Operating Precautions:* It shall be the duty of the person in charge of the premises wherein any refrigerating system is located to exercise due diligence to see that the refrigerating system is properly maintained and operated at all times.

A gas helmet or mask suited to the refrigerant used shall be provided with every Class A system, and with every Class B system that operates above atmospheric pressure except when carbon dioxide is used.

Every gas helmet or mask shall be of a type approved by the Chief Inspector of the Department for the Inspection of Steam Boilers, Unfired Pressure Vessels and Cooling Plants as being suitable for the refrigerant used, shall be inspected annually by said

chief inspector and shall be kept in operative condition in an easily accessible case or cabinet.

Whenever a flammable or irritant refrigerant is drained from any system it shall be discharged into a suitable absorbent or container which shall not be connected to the system except during period of charging or withdrawing refrigerant.

Whenever the losses or refrigerant from a system are such as to endanger the health or lives of the human occupants of any room or structure in which such refrigerating system, or any part thereof, is located, it shall be the duty of the owner of such refrigerating system to apply suitable pressure or other tests to prove the system tight.

SECTION —.

Instruction and Refrigerant Charges to Be Posted

It shall be the duty of the owner of any refrigerating system, except a Class D and E system, to post and keep conspicuously posted as near as practicable to the pressure-imposing element of such system a card giving operating directions for such system, including precautions to be observed in case of a breakdown or leak. The following shall be included in the instructions and information listed on such cards:

1. Instructions for shutting down system in case of emergency.
2. The name, address and telephone number of every engineer or operator in charge.
3. The name, address and day and night telephone number for service.
4. The location of the nearest fire alarm box.
5. The telephone number of the Department for the Inspection of Steam Boilers, Unfired Pressure Vessels and Cooling Plants, and instructions to notify said department immediately in case of serious leakage or other emergency.
6. The date, amount and kind of refrigerant placed in the system at the time of initial charging and every subsequent re-charging and the name and address of the person, firm or corporation charging or re-charging the system.

Every single unit refrigerating system shall have attached in a permanent manner and in a conspicuous place within or on the refrigerated space, a metal tag or other emblem containing the following information, in legible words and figures: maker's name, kind and amount of refrigerant used, test pressures applied.

Every Class A, B, C and multiple Class D system shall have the name of the refrigerant painted or affixed in a permanent manner either to the pressure imposing element or to the piping in proximity thereto. The kind of refrigerant and instructions for shutting off refrigerant shall be prominently posted at the branch valves used for shutting off such evaporator or set of evaporators contained within each refrigerated space.

Detroit Amends Refrigeration Ordinance

New Ordinance Provides for License Regulation of Service Men Including $1000.00 Bond for Faithful Observance of Code Provisions.

AN amendment to the Detroit (Michigan) City Ordinance relative to the inspection, regulation and operation of ice making, cooling and multiple refrigeration plants was passed by the Detroit City Council, and approved by Mayor Frank Couzens on April 7, 1936.

Sponsored by the Detroit Chapter of the Refrigeration Service Engineers' Society and the Detroit Masters' Association, the new code provides for the licensing of installers and service men of all types of refrigerating equipment, including a bond of $1,000.00, which must be filed with the Department of Buildings and Safety Engineering for the observance of the code.

The new provisions of the code are as follows:

An Ordinance to amend Chapter 130 of the Compiled Ordinances of the City of Detroit of 1926, relative to the inspection, regulation and operating of Ice Making, Cooling and Multiple Refrigeration Plants, by adding a section to be known as Section 1 (a).

It Is Hereby Ordained by the People of the City of Detroit:

Section 1. That Chapter 130 of the Compiled Ordinances of 1926 be and the same is hereby amended by adding a section to be known as Section 1 (a) reading as follows:

Sec. 1 (a). No person, firm or corporation shall, or shall contract to, install, alter or service any refrigerant containing part of any refrigerating system, without first securing a license from the Mayor of the City of

Detroit except as herein provided for. This ordinance shall not apply to new installations of self-contained domestic units having a capacity of not more than six pounds of any refrigerant. License to install, alter and/or service any refrigerating system shall be issued by the Mayor upon the recommendation of the Commissioner of Buildings and Safety Engineering after application in writing has been made to the Commissioner of Buildings and Safety Engineering and a fee to be established by the Board of Rules of the Department of Buildings and Safety Engineering has been paid and a bond in the sum of One Thousand Dollars ($1,000.00), running to the City of Detroit for the faithful observance of the provisions of the ordinance has been filed with the Department of Buildings and Safety Engineering. Such bond shall be a personal bond with two sureties, or one from a recognized and approved surety company acceptable to and approved by the Corporation Counsel of the City of Detroit.

All such licenses shall be renewed annually and shall be revokable by the Mayor upon the recommendation of the Commissioner of Buildings and Safety Engineering, for gross incompetence, gross neglect, deliberate misrepresentation or wilful failure to comply with the requirements of this ordinance.

Licenses shall be classified as to definite types of refrigerants used in the installation and/or service of refrigerating systems and applicants may be licensed for that particular refrigerant: Provided, however, any person, firm or corporation may make application for and receive a license to engage in the installation and/or service of all classes of refrigerating systems.

No license shall be issued until applicant has shown to the Department of Buildings and Safety Engineering by sworn affidavit that he, or it, has been actively engaged in the installation and/or service of refrigerating systems for a period of at least three (3) years, or has in his employ and actively in charge a person who has been engaged in the installation and/or service of refrigerating systems for a period of at least three (3) years.

Sec. 2. All ordinances and parts of ordinances in conflict herewith are hereby repealed.

Sec. 3. This ordinance is hereby declared to be immediately necessary for the public peace, health, and safety and shall take immediate effect.

FRANK COUZENS, *Mayor.*

Approved April 7, 1936.

FLOYD L. BROWN, KILLED IN ACCIDENT

FLOYD L. BROWN, secretary of the S. A. Long Electric Company, distributors for Frigidaire Corporation, and in point of years senior service manager in the Frigidaire organization, was killed in Joplin, Mo., May 8 when he slipped and fell, suffering a fractured skull.

Pioneer in the development of the Delco-Light business and then its offshoot, the Frigidaire business, Mr. Brown had been an associate of S. A. Long for twenty years, occupying a position as a member of the firm and serving as district service and installation manager. He was in Joplin to attend a meeting with service and sales personnel when the accident occurred.

His hobby was the service he was able to render as a friend of under-privileged children and he often stated that it was his desire to be able to lend encouragement to some poor lad who needed only a little boost to reach a high and useful goal.

Mr. Brown is survived by his widow, a daughter, Alice Jane, 18, and a son, Floyd, Jr., 22, who is employed by the Long Electric Company.

J. Curtin,
Texas.

I enclose remittance for my renewal. I look forward to each issue of the magazine. I think we are fortunate in having such a paper for our business. I find it most helpful.

R. King,
Oregon.

I don't want to miss an issue, so please credit the enclosed remittance on my account.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box." The following questions are answered by Mr. George H. Clark.

ZEROZONE SO_2

QUESTION 131. *I am having trouble with a Zerozone SO_2 job using an expansion valve and brine tank. The job will not pull a vacuum although the compressor was overhauled. It is impossible to get a vacuum setting on the expansion valve. Unit will cycle a short time and then a sludge stops up the expansion valve. New oil also turns black almost immediately, although it was changed twice. System was clean to begin with. Is it possible that the trouble is the oil? What grade oil is best for this job? Is it possible to get data which will give the right grades of oil for different units?*

ANSWER: Regarding the Zerozone machine, I think it is quite possible that the expansion valve has a defective spring in it which makes it impossible to get a vacuum setting on the valve. I have had personal experience with this same thing in that a Zerozone expansion valve could not be adjusted to operate at a vacuum and it was found that the spring inside the valve which tends to close the needle had become corroded so that it did not exert any force and as a result with the suction pressure at atmospheric or below, no force was exerted on the needle to keep it closed and consequently the refrigerant would run through freely at pressures lower than atmospheric.

Regarding your oil trouble, I believe that your trouble has been due to moisture in the refrigerant or to a leak which allows moisture to enter the system in some manner. The oil you have been using was probably an amber oil and amber oils treated with sulphuric acid will decarbonize and the carbon will appear as a sludge. With moisture in the SO_2 and using an amber oil, this decarbonizing takes place in the refrigerating system and the carbon sludge causes a great deal of trouble.

I would suggest that the system be thoroughly cleaned again and that fresh white oil and new refrigerant be used and that the expansion valve be replaced, and I believe you will find that the machine will operate all right.

It may be possible that you have a low side leak in the brine tank. If such is the case, moisture might be drawn in under some conditions which would cause a great deal of trouble in the system. It would be well to check the system very thoroughly for leaks.

SERVEL TYPE E6

QUESTION 132. *I am servicing an old Servel, type E6, No. A20,168, compressor No. A50,301. In the old real ice box days, the waste water went into an iron pipe, through the floor and into a sink in the cellar. When we got the Servel we stopped up this pipe. In the case of the Servel, when the evaporator is defrosted, the waste water runs into a pan. I propose to save myself some work. So I would like to attach a rubber to the end of the copper drip pipe, through the plug in the drip pan and into this old drain pipe which leads to the cellar. Do you think that the sewer gas (if there is any) would have any effect on the taste of the food or the operation of the box?*

ANSWER: If this drain pipe is the same as is used in the ordinary ice box, there is no possibility that sewer gas might return into the refrigerator and cause any taste in foods. In the ordinary ice box drain there is always a trap in the drain connection at one place or another. This trap requires that the water be raised above a certain point before the water actually passes into the drain and it maintains a water seal which will prevent the gases from the sewer from backing up through the drain connection into the refrigerator.

It may be possible that where the refrigerator drains directly into the sink in the cellar no trap is provided. This trap may easily be made, of course, by bending a piece of copper tubing to form a trap. The diameter of the tubing should be large enough so that the water can run from the tube properly; and not run through by spurts which would cause the trap to drain by a syphon action.

SOLENOID VALVE

QUESTION 133. *I have just received an answer to my last inquiry and found it very satisfactory and complete. I appreciated it very much.*

In the answer to one of my questions you said something that I didn't quite understand. That was about using a solenoid valve in the liquid line in conjunction with a thermostat. I can't understand why it would be an advantage to use this valve in the liquid line with a thermostat, and it would be of no advantage in the liquid line when you are trying to maintain separate temperatures on the same defrosting unit. What I meant when I asked the question was to use thermostat on all the different boxes or evaporators with different temperatures that would start the machine when that particular box warmed up enough to close the thermostat circuit and at the same time open the solenoid valve in the suction line of that particular box or evaporator. When the box is cold and the thermostat is open the solenoid valve will be closed and the running of the machine to cool some other box will not have any effect on the one that has its solenoid valve closed. Why I was asking this is to get away from pressure switches and two-temperature valves.

Boiling Point of Refrigerant

I was just looking over a characteristic chart of several refrigerants and found that the lower the boiling point of the refrigerants the less the number of cubic feet of gas to be pumped to produce the same amount of refrigeration. I understand why the amount liquid refrigerant in pounds would vary, either more or less, which would be determined by the latent heat of the refrigerant per pound. The only thing I decided was that specific heat of the gas increased which would require more heat to raise it to predetermined temperature. That is the specific increases as the boiling point lowers. This may be far from right.

Do you know the reason why an ice cream cabinet which is low of brine will keep the suction pressure from pulling down? I checked one twice with the suction pressure at 5" and afterwards added four lbs. of brine and machine has been operating all right.

ANSWER: With respect to the installation of solenoid valves, it is usually an advantage to use solenoid valves in the liquid line of the evaporators rather than the suction lines, because a smaller valve can be used which cuts down on the cost. A liquid line valve having an orifice of $\frac{1}{8}$ to $\frac{5}{16}$ of an inch will pass sufficient liquid refrigerant to take care of considerably more than a ton of refrigeration with no drop in pressure through the valve. In order to get by with no drop in pressure through a suction line valve if it was to be operated on a coil which was capable of producing a ton of refrigeration, you would undoubtedly have to have an orifice of at least $\frac{1}{2}$ inch diameter, more or less depending on the refrigerant used. It is perfectly all right to use suction line valves and the individual thermostats may be connected into the machine so that any thermostat in the system will start the compressor and any thermostat in opening could close the solenoid valve in the suction line of the coil in the individual cooler in which the thermostat was located.

For all around cost and nicety of operation, however, I believe you will find that the small size solenoid valve used in the individual liquid lines and operated by the thermostat will be more practical. It is possible, of course, that each thermostat may be wired to start the machine when it closes and that all thermostats will have to be open in order to stop the machine. However, the cost of wiring in this way in a good many instances will exceed the cost of installing a pressure control at the unit for the purpose of starting and stopping the machine. In addition it may often be possible that the warm coils on the condensing unit may be operated by

the thermostats and solenoid valves while it is practical to operate the coldest coil on the machine from the pressure control itself; so that in this case the cost of the installation is decreased without sacrificing performance in any way.

When using a low pressure control for stopping and starting the machine, another advantage is apparent in having the solenoid valves installed in the liquid lines; that is, if the valves were all in the suction line, as the solenoid valves all closed, the suction pressure at the machine would be reduced rapidly, which would cause an oil sludging condition.

It may be possible that your installation has flooded type evaporators. In this case, solenoid valves installed in the suction line are the only practical way to use them as refrigeration would continue in each coil with the solenoid valves closed until all the refrigerant in the coil had been evaporated and stored in the receiver. In addition, this would pump down the system each time the solenoid valves closed; and with many evaporators connected to one machine, the receiver would probably not be large enough to hold the full charge of refrigerant.

In general, the lower the boiling point of the refrigerant, the lower the number of cubic feet of gas that will have to be compressed to produce the same amount of refrigeration; and this is due largely to the fact that the refrigerants having the low boiling points operate at comparatively high suction pressures to produce proper refrigeration temperatures. The higher the pressure of the gas, the greater its density; or in other words, the fewer cubic feet there will be per pound of refrigerant. Thus a smaller number of cubic feet will have to be pumped through the compressor in order to circulate a definite number of pounds of refrigerant; and the quantity of refrigeration done depends largely on the number of pounds of refrigerant circulated and the latent heat of the refrigerant. The quantity of refrigeration done by increasing the temperature of the vapor in the evaporator is practically negligible.

I do not know of any reason why the suction pressure of an ice cream cabinet should not pull down due to the brine being low. Ordinarily it would work the other way. I believe that there may have been some other factor involved which was not made apparent.

DISPLAY CASE

QUESTION 134. *Can you give a reason for the following condition which I recently found in a display case using a pressure controlled methyl chloride system and hooked up as shown in Fig. I. The refrigerant flow control is a thermostatic expansion valve.*

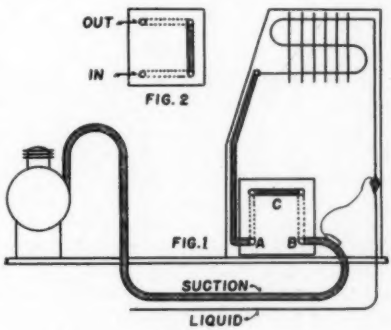


FIG. 1.

On attaching the gages I found the compressor would quickly draw a high vacuum, showing that no refrigerant was passing through the cooling coils. Testing showed liquid refrigerant at inlet flare nut (a) and no pressure or liquid at outlet flare nut (b), apparently indicating a restriction in the lower cooling coil.

"Pinching off" the line near inlet flare nut (a), cracking the connection and allowing the refrigerant to escape caused the coil to frost from this inlet flare nut to the point indicated at (c).

On removing this coil from the line and testing I was surprised to find that the coil was not clogged and am at a loss to explain why the refrigerant, as a liquid or a gas, would not pass as was evident by the area of frosting the point indicated at (c).

This coil, connected in the line as shown in Fig. 2, is now working satisfactorily.

ANSWER: The condition you state is "just one of those things" that frequently occur in refrigeration. It would be difficult to offer a definite explanation of your trouble, but I

would say in all probability it was some combination of dirt and oil plugging the coils as was indicated by the fact that no refrigerant would pass through the one coil. On opening up the line at point (a), any refrigerant in the coil between (a) and (b) backed out the opening (a) and probably dislodged the plug in the line.

If this coil had been reinstalled as it was in the first place, it would undoubtedly have worked all right. I doubt very much if the reason for the coil's operating when reinstalled was due to the change in hook-up at your coil connections.

DAIRY JOB

QUESTION 135. *We are desirous of making a change in a dairy job and before going ahead would like to have your opinion as to how this change should be made to check it against our own idea.*

This installation consists of a 1 hp. SO_2 *Brunner air-cooled compressor, a 100 gallon brine tank using calcium chloride, insulated with three-inch Rock Wool, and a* $5 \times 7 \times 9$ *ice box with an average of four inches of saw dust insulation. We have recently installed a new Fedders expansion type Fed-R-Fin coil having a capacity of 275 square feet. There are no baffles in this ice box and the coil is hung about three inches below the ceiling in order to give them plenty of head room. We recently hung a drain pan about four inches below the coil and about two inches larger than the coil all around still leaving plenty of room on all four sides for the circulation of air. However, this immediately made a difference of about 10° in temperature in the ice box. We noticed that when we removed this drain pan the temperature immediately dropped down to what we considered normal or about 38°. Would you suggest baffling this box or using a fan to increase the circulation of air?*

The owner of this installation now desires that we remove a Frigidaire flooded coil in the brine tank and install an expansion type coil in its place believing that a large coil of the expansion type would increase his efficiency considerably. This brine tank is used on a milk aerator wherein he runs a hundred gallons of milk over it from a pasteurizer. In operation this milk is pumped from the pasteurizer at 145° F. to the top of the aerator. The upper half of this aerator has city water running through it, and it cools the milk down to about 65 to 70°. Then the brine continues the cooling process and brings the temperature of the milk down to 40°. By the time he has finished running his 100 gallons of milk over the aerator his final temperature is 48°. In other words, there is a difference of 8° in temperature from the start to finish.

Would like to have your opinion of what type coil to install in this brine tank that would enable him to get a better and more efficient service. There are no two-temperature valves on this job as we did not think it necessary to cool the brine any lower than what we would have liked to cool the ice box. By the way, this 100 gallons of milk is run over the aerator in about one hour's time, and that is the only time in about twenty-four hours that it is used. Any suggestions or advice on this problem will be greatly appreciated.

ANSWER: With respect to baffling the $5 \times 7 \times 9$ cooler in which you have a finned type coil, I would suggest that you draw the drain pan up to within about two inches of the coil on one side and let it down about eight inches lower than the coil on the other side. This will give you a much better circulation and will probably lower your cooler temperature to very nearly normal. The drain pan in the horizontal position requires that the air spilling down over the coil pass out from both sides of the drain pan down into the lower part of the cooler; and the warm air returning to the upper part of the cooler also comes up between the drain pan and the walls of the cooler, and we have a passageway on each side of the drain pan where cold air is attempting to go down and warm air up. By slanting this drain pan from one side to the other, we will approximate the conditions of a single L type baffle, and the air will circulate up one side of the cooler, spill down over the coil and down the other side of the cooler; which will give us a much better air circulation than with the present set up. It may not be quite as good as far as cooling goes as it is when there is no pan under the coil at all. The

water may drain from one edge of the pan to the drain outlet.

With respect to changing the type of coil in the brine tank used in conjunction with the milk pasteurizer, I would suggest first that you check your flooded type coil to see if it is not taking care of the job efficiently at the present time. To do this obtain the brine temperatures and the suction pressure at the machine at the same time. Refer to the tables on refrigerants and determine what the evaporation temperature is for the suction pressure you have. If this evaporation temperature is not more than 5° to 8° colder than the brine, it is a pretty good indication that the evaporator you have is operating efficiently at the present time. If the evaporation temperature is as much as 15° lower than the brine temperature, you can doubtless improve on this condition by using a dry expansion coil and a thermostatic expansion valve.

A coil consisting of 100 feet of ½ inch tubing will be more than sufficient to take care of all the refrigeration that your machine can supply.

I gather from your figures that you have approximately 3,000 lbs. of brine in your tank which supplies the aerator. The difference in final milk temperature might be held closer from start to finish of the run if a larger brine tank was used. It might be an advantage to install a thermostat in your walk-in cooler and have it operate a solenoid valve in the liquid line feeding the finned type coil. This thermostat then might be set to hold the desired temperature in the cooler. When this temperature is reached, the full capacity of the condensing unit works on the brine and it might be desirable to lower the temperature of this brine possibly 5° lower than you now have it. If your machine is in good working order, I believe it should take about six hours steady running to chill your brine down after the milk has been run through the pasteurizer. Not knowing what brine temperatures you now have and what pressure control settings you are using, I cannot give you any more definite information than this.

Multiple Service

Shooting Service on Apartment House Multiple Systems

Diagnosing Trouble and Conditions to Look for in Multiple Installations. Multiple Installation Servicing Is Not as Difficult as Commercial Servicing Which Requires Various Temperatures. Follow Service Pointers in May Issue Under Household Service, Including the Suggestions Outlined in This Article.

By GEORGE CLARK, B.S., M.E.*

THE apartment house multiple system combines a number of evaporators using low pressure float valves or thermostatic expansion valves on one condensing unit. The apartment house multiple system is somewhat different in its action than the commercial system, as in the apartment house system all the evaporators on the same unit are intended to operate at the same temperatures, while on the commercial system various temperatures may be required in the various evaporators, all of which operate from the same condensing unit.

The service on the multiple apartment house system then is somewhat simplified from the service on the commercial machines, which may require various temperatures. In following through the service calls mentioned

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under "household refrigeration service" outlined in the May issue, the points mentioned there in general apply to multiple systems in apartment dwellings. These service calls are listed here with any additional calls which may apply to this particular type of refrigerating system.

SERVICE CALL NO. 1
The Refrigerating Machine Does Not Operate

The causes as listed under "household" service, published in May, are:

A. Power line dead.
B. Burned out fuse or overload relay open.
C. Defective motor.
D. Control switch not closed.

The remedy for these interruptions in service are the same as those listed under "household" service in the same article. The overload relay is usually located in the motor relay instead of in the control itself. In addition to these causes for interruption of service, we may list other causes:

Cause E. Defective motor relay.

Remedy. Repair or replace relay.

Cause F. The high pressure cut-out switch open.

Remedy. Determine cause of high pressure and make proper repairs. This may include a plugged liquid line, air in the system, or insufficient or no water to the water cooled condenser.

SERVICE CALL NO. 2
Machine Short Cycles

Cause A. Leaky low side float or thermostatic expansion valves in the system.

Remedy. Repair or replace faulty valves.

Cause B. Leaky compressor head valve.

Remedy. Replace or repair.

Cause C. Differential adjustment of control too small.

Remedy. Reset control for higher differential.

Cause D. Improper adjustment of thermostatic expansion valve or improper calibration of low pressure float valve.

Remedy. Readjust, repair or replace faulty valve.

Cause E. Partially plugged screen in liquid line or partly plugged line.

Remedy. Locate plug and clean out.

Cause F. Partially plugged suction line.

Remedy. Locate plug and repair.

Cause G. System low on refrigerant.

Remedy. Add necessary refrigerant to system.

Cause H. Excess refrigerant in system, causing high head pressure and high pressure cut-out to open.

Remey. Remove excess refrigerant from system.

Cause I. Air or non-condensable gases in system.

Remedy. Purge air from receiver.

Cause J. High pressure cut-out opens and closes due to insufficient cooling water through water cooled condenser.

Remedy. Open water valve for greater flow of water or if condenser tubes are partially plugged, wash out with some solvent so as to allow greater flow of water through tubes.

Cause K. High pressure cut-out set to operate at too low a pressure.

Remedy. Reset for higher pressure or, if non-adjustable, replace.

SERVICE CALL NO. 3
Machine Operates Continuously

Cause A. Low on refrigerant.

Remedy. Add refrigerant and check for leaks.

Cause B. Excess refrigerant.

Remedy. Remove excess refrigerant.

Cause C. High head pressure which may be due to air in lines, excess refrigerant or ineffective condenser.

Remedy. Purge air, remove excess refrigerant or improve on condenser effectiveness.

Cause D. Low compressor capacity may be due to defective piston valves or head valves or piston rings, ineffective scored cylinder or anything which may cause low volumetric efficiency.

Remedy. Locate cause of low capacity and repair.

Cause E. Electrical trouble such as control contacts not opening properly or motor relay not opening when control circuit is open or fault in wiring.

Remedy. Locate and repair fault.

SERVICE CALL NO. 4

Frost Back on Suction Line

Cause A. Defective float valve, defective thermostatic expansion valve or thermostatic expansion valve improperly adjusted.

Remedy. Repair or replace float valve, adjust thermostatic expansion valve or, if defective, replace.

Cause B. Insufficient refrigerant.

Remedy. Add refrigerant to the system.

SERVICE CALL NO. 5

Odor Around Refrigerator

Cause A. Refrigerant leak in high side.

Remedy. Locate and repair leak. In a sulphur dioxide system use an ammonia swab to locate leaks. In methyl chloride or "Freon" system, locate leaks with a leak detector torch. In other systems having a pressure greater than atmosphere on the high pressure side of the system, check for leaks with oil or soapsuds around connections where leak may occur, repair leak and check system for operation. Recharge if necessary.

Cause B. Leak in low pressure side of the system.

Remedy. Locate leak by building up pressure in low pressure side of the system by warming up the evaporator or by putting a refrigerant pressure on low pressure system by means of a drum of refrigerant. Check leaks the same as in high side. In case of seal leak, remove compressor to shop and repair seal. If leak is in connections, repair faulty connection and put system in operation, recharging if necessary. If system is a sulphur dioxide system and air may have been drawn in through the low side leak, the system should be cleaned out and recharged or a suitable drier should be installed in the liquid line.

Cause C. Brine tank leaks.

Remedy. Check brine tank for leaks. If odor is denatured alcohol rather than the refrigerant used in the system, the leak is undoubtedly in the brine tank. Remove and resolder and refill or replace.

Cause D. Overheated motor due to insufficient oil in motor bearings.

Remedy. Oil motor bearings and check operation of motor to see that the temperature does not become excessive. If trouble is not in bearings, remove motor for repair, or replace.

Cause E. Food or paint odor.

Remedy. Advise customer to keep foods which easily take on flavor from other food well covered. Any liquids in refrigerator should be kept covered. Check refrigerator to find if there may be some stale foods in the refrigerator which customer may have forgotten. If odor is due to finish in refrigerator, refrigerator should be refinished or replaced.

SERVICE CALL NO. 6

Refrigerators in the System Too Warm

Cause A. Improper control setting.

Remedy. Check control setting with gage and adjust to proper setting.

Cause B. Insufficient refrigerant.

Remedy. Add necessary refrigerant.

Cause C. High head pressure due to excess refrigerant, air in system or partially plugged lines.

Remedy. Locate cause of high head pressure and make necessary repairs.

Cause D. Low compressor capacity.

Remedy. Check compressor piston valves, head valves or anything which might cause low volumetric efficiency.

Cause E. Frost back or flood back of refrigerant.

Remedy. Locate evaporator or evaporators which are causing trouble and replace float valves or thermostatic expansion valves on these evaporators.

Cause F. Insufficient liquid to the evaporators caused by partially plugged liquid line.

Remedy. Locate plugged line or screen and repair.

SERVICE CALL NO. 7

One Evaporator Warm, Other Evaporators at Proper Temperatures

Cause A. Plugged screen in liquid line of the individual evaporator.

Remedy. Open plugged line or screen.

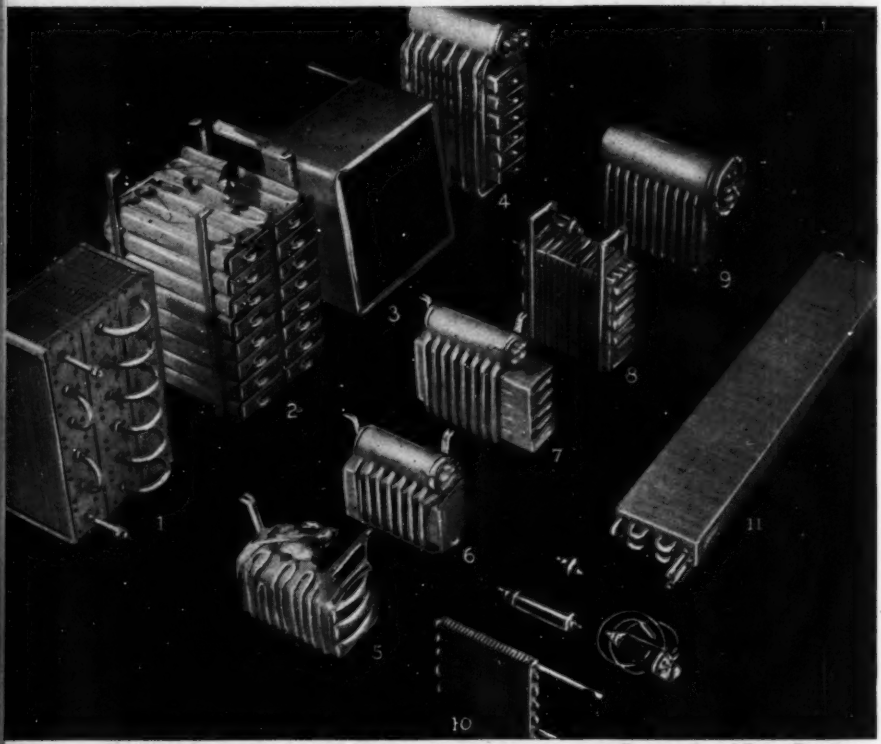
Cause B. Suction line partly or completely plugged.

Remedy. Locate plug and repair.

Cause C. Low pressure float evaporator oil bound.

(Continued on page 60)

FEDDERS QUALITY LOW



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1. Non-Frost Commercial Evaporator.
2. Ice Cube Maker Evaporator.
3. Forcedraft Unit Cooler.
4. Heavy Duty Flooded Cooling Unit.
5. Prestalloy Household Evaporator.
6. Household Flooded Cooling Unit.
7. Four-tray Cooling Unit.
8. Dry Expansion Evaporator for Ice Cube Making and Cabinet Cooling.
9. Ice Cream Cabinet Cooler.
10. Condenser.
11. Flat-Fin Commercial Evaporator.

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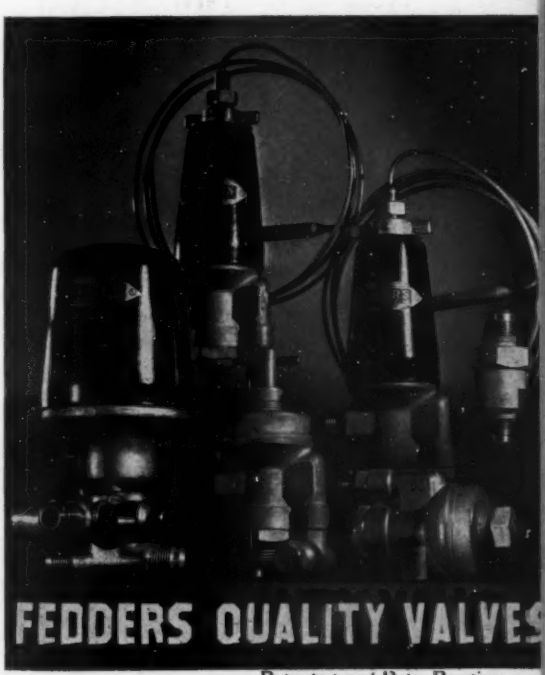

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It gives valuable service tips and installation data written by Joe Askin, Fedders Chief

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The REFRIGERATION SERVICE ENGINEER

A Monthly Illustrated Journal, Devoted to the Interests of the Engineer Servicing Refrigeration Units, Oil Burners and other Household Equipment.

Vol. 4 June, 1936 No. 6

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THREE CANDLES ON OUR BIRTHDAY CAKE

IN June, 1933, the first issue of THE REFRIGERATION SERVICE ENGINEER was published. This current issue (June) inaugurates the beginning of our fourth year; still an infant as years are numbered, but we feel confident a helpful influence to the field which this publication has dedicated itself to serve.

Today, with a firmer conviction than ever to use every energy at our command to further the interests of the men engaged in this expanding industry, we reiterate the policy so definitely outlined in that first issue as follows, "THE REFRIGERATION SERVICE ENGINEER offers a forum for the exchange of ideas and experiences, open to all including the service men identified with independent service organizations, service departments of manufacturers, distributors and dealers. THE REFRIGERATION SERVICE ENGINEER has no pet theories to advance, and no man or class of men has any private influence with it. Its columns are open to all interested in the advancement and improvement of service engineering. It will strive to become indispensable to all."

Much has transpired in these three years. They have been eventful for us in the publication of *your* trade journal. They haven't been without their worries, but withal, they have been most interesting in planning each issue to better serve this industry. The door has been open at all times for constructive criticism for its improvement, and the same policy will continue. With considerable pride, we number the many friends that this journal has made, and among the pleasant experiences have been the splendid letters from its readers, all to the effect the help THE REFRIGERATION SERVICE ENGINEER has rendered to this field.

Three years have witnessed numerous changes. The servicing business has probably recorded more progress during this time than any previous corresponding period. Sales of new refrigerators have boomed—air conditioning has secured a definite foothold, and all of these activities have contributed their share to insure a steady increasing business for the service and installation engineer. Manufacturers of equipment and supplies have contributed in the notable improvement made in equipment during this period—distribution has progressed to the point of a nation-wide network of supply stations where service engineers can secure with few exceptions prompt attention to their requirements irrespective of their geographical location.

Please don't misunderstand us that THE REFRIGERATION SERVICE ENGINEER assumes responsibility for such fine progress, but rather we have been happy to be identified with the industry during such an important time. The credit is due to those service engineers in the field and shop, whose vision and confidence in the business have steadily contributed to the advancement of all. They have done a real job in assisting to establish the business on a substantial foundation. Much is yet to be desired, but definite results are being accomplished in the right direction. Such activities will always be supported by this journal.

An anniversary, like the commencement of a new year, affords an appropriate time to turn over new leaves or to renew the pledge of more effective work. To that end THE REFRIGERATION SERVICE ENGINEER again pledges its fullest support.

NEW MECHANICAL DEVICES
Service Tools and Special Equipment

Under this heading there will be published illustrated descriptions of new or improved service tools and equipment for the Service Engineer. Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

NEW FEDDERS DRAIN BAFFLE

A NEW drain baffle for installation under natural convection coils is now manufactured by the Fedders Manufacturing Co. of Buffalo, N. Y. It includes many unique features which will suggest its adaptability in a number of installations. The new drain baffle is called Fed-R-Vex.

The troughs are adjustable for length so that the drain baffle fits each installation exactly. It is easy to install, and is designed so that it can be assembled and installed on the job. This feature makes it rather easy for a man to install it in close quarters, and eliminates heavy lifting overhead.

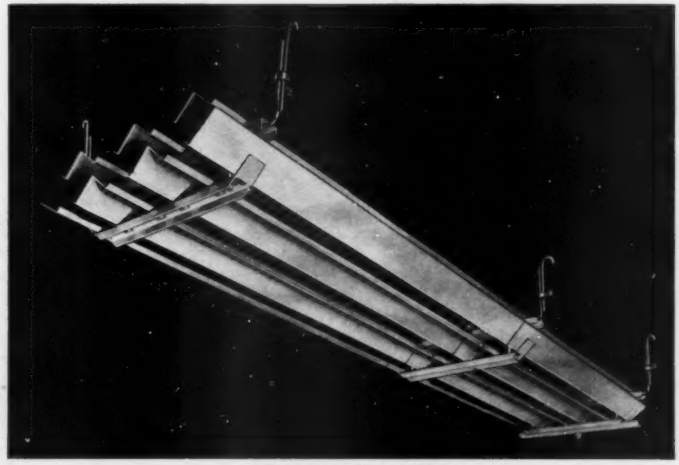
Cross brackets are first placed in position, and then the troughs are easily set in place, one section at a time. The hanger hooks are adjusted, and no drilling is required, and the desired pitch to carry away the condensate is easily secured.

Fed-R-Vex gives active circulation over the entire coil with practically no restriction to the flow of air, thus assuring a more even temperature throughout the box. The condensate from the under side of the upper row of troughs drains into the lower row, where it is immediately carried away. The double deck construction provides a second row of troughs in the lower zone, thus resulting in a neat sanitary installation. The drain baffles are made of permanent non-rusting material.

Complete circular with available sizes can be secured from Fedders jobbers, or from the Fedders Manufacturing Co., Buffalo, N. Y.

NEW HOT JAW PLIERS

A LOW-COST utility tool suitable for making solder connections, known as Ideal "Thermo-Grip" pliers has been announced by the Ideal Commutator Dresser



FED-R-VEX DRAIN BAFFLE

Co., 1568 Park Avenue, Sycamore, Illinois.

Especially developed for holding work while it is being soldered, these electric heating pliers are highly adaptable for work in the refrigeration field. They are unequalled for making sweated joints in the new solder type copper pipe and fittings. They can be worked in close quarters where clearance would not permit the use of wrenches and threaded fittings, without possibility of burning woodwork or ceilings. Among other applications may be mentioned their use for applying and removing solder lugs, and other work on all types of solder connections. A thimble or pipe cap can be held between the jaws for heating small quantities of solder.

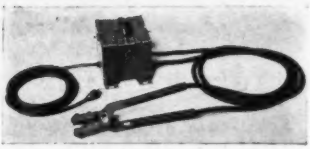


FIG. 1. "THERMO-GRIP" PLIERS

The unit illustrated, Fig. 1, takes the place of an open-flame blow torch or burner. When the wire connections are plugged into any 110 volt a.c. lighting circuit, current passes through the transformer and rapidly heats the jaws to a white-hot temperature. Engineers say that they are less dangerous than open flame for working

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around gases. Fig. 2 shows the "Thermo-Grip" pliers being used to make a sweated joint.

These pliers have renewable carbon jaws, insulated fibre handles and a Hi-Lo heat control switch.

FIG. 2. MAKING A SWEATED JOINT

The entire unit is portable, weighing 14 pounds complete (plier and cord which is held by operator only 5 pounds), is safe, shock-proof and sturdily built. The cord connection is 10 feet long. Two six-feet lengths of heavy duty cable connect the transformer and pliers, allowing plenty of freedom for worker's movements.

ADDITIONS TO ANSUL STAFF

WALTER O. Walker (Ph.D., The University of Chicago), for the past four years head of the Department of Chemistry at the University of Miami, Coral Gables, Fla., has become Research Director for the Ansul Chemical Company, Marinette, Wis.

Q.-A. REPLACEMENT PARTS

Toggle Shelf Hooks, Rubber Shelf Buttons, Cross Bars, Cross Bar Brackets, Tray Fronts, Clamps, Bushings, Universal Mounting Brackets, Etc.

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Philip J. Ehman (Ph.D., The University of Chicago) has also joined the Research Staff. He resigned as Research Chemist for Continental Can Company, Inc., in favor of the new position.

* * *

CUTLER-HAMMER REFRIGERATOR CONTROL FOR REPLACEMENT SERVICE

THE Cutler-Hammer refrigerator control unit for replacement service is made in four types which will take care of almost any domestic refrigerator installation. These types include temperature control units with 24" and 48" of capillary tubing and pressure units for methyl chloride and sulphur dioxide systems.

A complete range of temperature adjustment is provided by a dial on the front of the indicating plate—ten settings, ranging from defrost to fast freezing are available. The defrost setting maintains a temperature which prevents food spoilage while assuring complete defrosting of the evaporator coils. The cold setting provides for the quick freezing of desserts and ice cubes.

Overload protection for the refrigerator motor is assured through the use of a Cutler-Hammer free tripping thermal overload relay which will automatically disconnect the motor when it is in danger of overheating. When an overload occurs the motor is shut off and the manual "on" and "off" button is released, the red stem of which acts as a visual indication that the circuit is open. A complete range of heater coils is available for the overload mechanism to assure positive protection for every size of refrigerator motor.

The temperature control unit is set and sealed at the factory so that the unit will cut out at 15° F. and cut in at 27° F. Variation of this setting can be made to provide a minimum cut-out temperature of 8° F. and a maximum cut-in temperature of 43° F.

The differential adjustment, to increase or decrease the difference between cut-in and

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Majestic—all models	$20.00
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Majestic Standard Compressors, exchange price	6.50
Majestic thermostat, exchange price	2.50

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The Scientific Air Conditioner for Refrigerators

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Everything the Service-man could possibly need . . . Tools, Supplies, Parts, Gasses, Motors . . . Everything listed for convenient use . . . Every Service-man should have this 80-page book on file. Write today!

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cut-out temperature, can be varied by means of a screw in the rear of the control.

Pressure controls can be varied in cold control adjustment and differential adjustment in the same manner as the temperature units.

A feature of the Cutler-Hammer control is that the modernly designed indicating plate can be mounted either vertically or horizontally and can be used in both large and small evaporator shield openings. This feature is of special interest to service men because it permits a very material reduction in the stock that must be carried to take care of the various types of refrigerators.

The complete line of Cutler-Hammer replacement controls are described in a booklet which will gladly be sent to any interested party, by addressing the company at Milwaukee, Wisc.

S S S

GILMER BELT CATALOG

A NEW 82 page catalog, containing full listings of Gilmer Belts for electric refrigerators, washing machines, water and beer pumps, woodworking machines, oil burners, is announced by the L. H. Gilmer Company, Tacony, Philadelphia. A complete list of standard fractional horsepower belts in 3/8", 1/2", and 21/32" widths is included, together with a list both by number, indicating the makes serviced by each belt, and by belt length.

S S S

ALTER BUYS REFRIGERATION DEPARTMENT OF WHOLESALE RADIO

THE Harry Alter Company, national distributors of refrigeration supplies and parts announce the purchase of the refrigeration supply division of the Wholesale Radio Service Company, who are discontinuing the sale of refrigeration supplies.

The Wholesale Radio Service Company, of New York, is one of the country's largest radio supply houses specializing in radio replacement parts and accessories, with branches in Atlanta, Chicago, Newark and the Bronx in New York City. They are dis-

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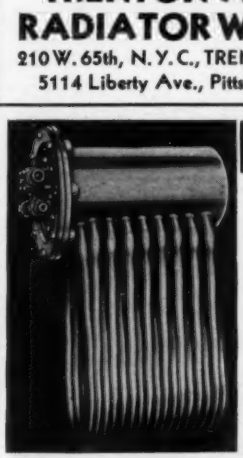

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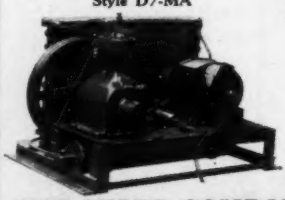
continuing refrigeration in order to devote their entire time and energy to their rapidly expanding radio business.

Now One of the Largest Houses

Harry Alter, president of the Harry Alter Company, stated, "Our deal in securing the refrigeration division of the Wholesale Radio Service Company was consummated with Mr. Berk, vice-president and general-manager of that large company, in charge of western operations. Customers who have been buying refrigeration supplies from "Wholesale" will be referred to Harry Alter and in each case it is Alter's plan to determine to their own satisfaction that they are engaged in the refrigeration business." Mr. Alter further said, "By acquiring the refrigeration division of Wholesale Radio Service Company, we are unquestionably the largest house of our kind in the world and will take every step to maintain this leadership." Mr. Berk of Wholesale Radio Service Company stated, "We are particularly gratified in selling our refrigeration supply department to the Harry Alter Company because we know that this reliable, well established supply house will take care of our former refrigeration customers. As far as Wholesale Radio Service Company is concerned, our plans for the coming season are so extensive that we are happy to be relieved of the detail of conducting the refrigeration department. Our new radio parts and supply catalog will be the best and biggest we have ever issued. Featured lines will be the 1937 La Fayette Radio and sound equipment. We look for the 1936-37 radio season to be the biggest in our history."

Condensing Unit Style D7-MA



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The most profitable and complete line to select from—just the size to build that refrigerator,—to assemble that condensing unit or to replace that old worn-out compressor.

Compressor Style J

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ADDITIONAL REPLACEMENTS ADDED TO ROTARY SEAL LINE

TO enable the service man to secure replacement seals for every type of equipment, the Rotary Seal Company has constantly added to its list of replacement units.

Just recently, it has announced fourteen new units, bringing the total list now available to 71. The replacement units are listed on convenient replacement sheets, which the service man can obtain from his jobber, or direct from the Rotary Seal Co., Chicago.

* * *

KRAMER INCREASES FIELD STAFF

THE Trenton Auto Radiator Works, makers of Kramer refrigerating equipment, has in the past month added five new field representatives to their organization.

Mr. Harry Klingler, formerly with Melchior, Armstrong, & Dessau now represents Kramer in Philadelphia and Eastern Pennsylvania, and Herbert H. Skinner, until recently with American Engineering Company in Philadelphia, is now the Kramer New England representative with headquarters at 252 Stuart Street, Boston, Massachusetts.

Mr. Jack Lacey is active in northern New Jersey and Mr. Clifford W. Thorn, formerly of the Trenton office staff, is now a member of the Pittsburgh branch sales force.

Mr. Frank B. Hutchins has been moved from the engineering staff to handle sales to national manufacturers out of Trenton. He will also represent Kramer in the Washington-Baltimore area.

"DON'T FIGHT 'EM JOIN 'EM"

IT'S an old saying with much value to YOU. Trained refrigeration service men ARE going places and will continue to fill the better positions as the industry continues to progress.

You too should be a fully trained man with all the needed technical knowledge so necessary for success in Electric Refrigeration and Air Conditioning.

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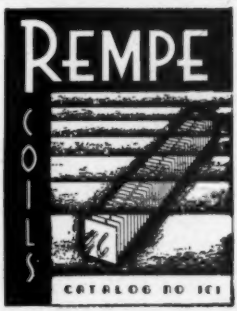

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The recently enlarged Trenton plant is now on a double-shift basis in the refrigeration and air-conditioning department, and reports the largest Spring low-side volume in the company's history.

* * *

REPAIR KIT FOR PORCELAIN REFRIGERATORS

AS an aid to recondition refrigerators which have been damaged from having the porcelain chipped, the Tuttle Tite-On Cement Co., Chicago, has been successful in developing an air-hardening porcelain cement that is not brittle and can be easily applied to these chipped places.

This firm has just placed on the market for the refrigeration trade a new and compact refrigerator repair kit consisting of two 2 oz. tubes of cement and a bottle of finishing liquid, together with special buffing paper and printed directions.

Where the refrigeration service man has to recondition a chipped porcelain surface on a refrigerator, a kit of this kind should prove indispensable, as it will often save the cost of replacement and is easy to apply.

This porcelain repair kit can be supplied in white, black or colors, and is made to match perfectly any porcelain refrigerator, washing machine, range, etc., of any manufacturer. The Tuttle Tite-On Cement Co. claims it is an ideal "touch-up" cement, which is being used by leading manufacturers throughout the country.

TUTTLE PORCELAIN REPAIR KIT

Additional information and literature may be secured from the manufacturer direct.

NEW WAY TO SWEAT JOINTS IN SOLDER COPPER PIPE

Ideal THERMO-GRIP Electric Heating Pliers replace blow torch—hold and heat work while being soldered. Fast—sure—safe. Low Cost. WRITE

Ideal Commutator Dresser Co.
1093 Park Ave. Sycamore, Ill.

PORCELAIN REPAIR KIT forServicemen

Tite-On is the ideal porcelain repair cement for chipped or cracked vitreous enamel surfaces. It's easy to apply and often saves the cost of replacements. No service department should be without Tite-On. Made in white, black and colors. Write for literature.

TUTTLE'S TITE-ON CEMENT CO.
4525 Ravenswood Ave., Chicago

Beyond Question—

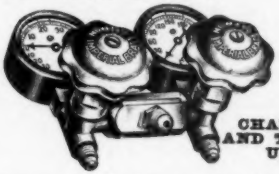
Rancostat, the Stainless Steel Thermostat, is beyond question the finest control unit ever built for domestic electric refrigerators. It is a precision instrument of outstanding accuracy. Easy to install and absolutely dependable. Write for new Bulletin—No. 655.

THE AUTOMATIC RECLOSING CIRCUIT BREAKER CO.
COLUMBUS - - - OHIO

For quick replacements and satisfied customers—

IMPERIAL Valves Fittings & Tools

EVEN more complete than ever before, this thoroughly modern line provides fully for the latest needs in servicing and installation. A few examples are shown:



CHARGING AND TESTING UNIT

For removing refrigerants, testing for leaks, preparing for charging, setting controls and expansion valves, etc. Equipped with Imperial "Sylpak" shut-off valves (operated on the sylphon principle). No. 200-C, $6.75.

TUBE CUTTER

A clean right-angle cut, without burrs or chips. Leaves tubing round, ready for flaring.

94-F, 3/16" to 3/4" tubing.....$2.25
104-F, 5/16" to 1".....$3.50

Order from your jobber. Write also for new refrigeration catalog 77-E.

192-CS (at left) sylphon principle. 100,000 cycle of oscillation without rupture. For solder fitting. $2.20 to $4.00.

93-C (at right). For multiple installations. Metal-to-metal seat makes leakproof seal. $2.40 to $3.18.

"SYLPAK" ANGLE SHUT-OFF VALVE

2-WAY BACKSEATING SHUT-OFF VALVE

IMPERIAL BRASS MFG. CO.
1200 W. Harrison St. Chicago, Ill.

MILLS

COMPRESSORS

for Commercial Use

Mills Novelty Co. • 4100 Fullerton Ave. • Chicago, Ill.

H. CHANNON DISTRIBUTES HERCULES LINE

THE H. Channon Co., Chicago, Ill., has recently announced that in addition to distributing the Brunner line of high-sides, they will also handle Hercules high-sides, manufactured by one of the largest manufacturers in the Middle West. Hercules high-sides are increasing distribution through distributors, and this equipment will become more popular in the service end of the business. All sizes and types are manufactured, ranging from ¼ to 20 hp. for both air and water-cooled jobs, using the well-known refrigerants.

H. Channon Co. will be represented in Iowa by Mr. G. R. Overton of Ottumwa, who has recently joined the sales staff of the company. Mr. Overton has had 15 years' experience in the refrigeration industry, and has been contacting service engineers, dealers and contractors in Iowa for a number of years. This addition to the sales organization is in line with the policy of Channon to provide the best possible service for the service engineer.

WELKER JOINS STANGARD PRODUCTS

STANDARD BODY CORP. announces the acquisition of Mr. Frank B. Welker as sales executive on their ice cream cabinet and replacement parts department.

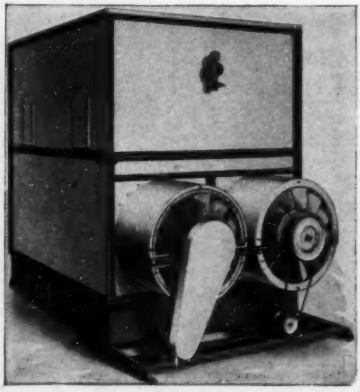
Mr. Welker, who was formerly associated with Kelvinator, Nizer's and the Dairymen's League, will supervise the territory between Washington, D. C., and New York City.

POSSIBILITIES FOR ADDITIONAL BUSINESS

By LEWIS H. SCURLOCK, *President*
Scurlock Kontanerette Corp.

RECENTLY, the writer was talking to a sales executive who told him of his purchase of a small car a few days before. The car did not carry a radio as standard equipment, and the automobile salesman gave him one of the finest sales talks he wanted to listen to as to why he should have a radio and purchase it at the time he bought the car on the installment plan. He told the salesman

BINKS SPRAY COOLING TOWERS
Indoor Forced Draft Type Will
Save Money for You!



What happens to the circulating water after it passes through your Ice Machine Condensers?

If discharged to waste you are literally pouring good hard earned dollars down the sewer! Check your water bills . . . see how much you are throwing away. You'll be surprised.

A Binks Cooling Tower permits the constant recirculation of the required supply, cooling and using it over and over again and again, substituting a small pumping charge for the former heavy water bills.

There are more than three thousand Binks Cooling Towers now in operation including sizes for all standard commercial refrigeration units. Let us tell you more about it, and how YOU TOO can cut the water costs of your present equipment by as much as eighty per cent.

Write Today for Bulletin No. 70

BINKS MANUFACTURING CO.
3151 Carroll Ave. Windsor, Ontario-Canada CHICAGO, ILL.

that he had a larger car that was equipped with a radio and wouldn't need one on this car. My friend then told me of having recently purchased a large refrigerator of standard make and he said nothing was said to him about buying any accessories, but after he received this refrigerator, he found that the wife had to buy a number of containers and glass dishes that would make the refrigerator more usable.

The automobile salesman and the automobile dealer and distributor have learned their lesson, sadly but well. Today, there are millions of dollars of automobile accessories and parts sold by parts jobbers, and the automobile distributor and dealer are getting only a small percentage of this business because they were asleep and they thought that selling an automobile was all that there was to it.

Is it possible that the refrigerator distributor and the refrigerator parts distributor are just like the automobile distributor and dealer of years ago? Is the refrigerator dealer so engrossed in the sale of refrigerators only that he refuses to take profits on many desirable and useful accessories and added equipment that could be sold at the time the refrigerator is sold without any additional effort?

The writer has talked with many refrigerator distributors and so many of them have told him that they were interested only in selling refrigerators. One large distributor last year who had sales of something like 40,000 units could easily have sold an additional $5.00 worth of equipment with each refrigerator to his dealer, and the dealer in turn could have passed it along to the customer, thereby adding $200,000.00 to the volume on which both the distributor and the dealer could have made a profit. Like the automobile distributor, the refrigerator distributor will become aware of the fact one of these days that somebody else is taking away from him the business which he could have now.

Recently, a brilliant young sales executive for one of our large distributors remarked to the writer that he believed he could see a change in the trend of merchandising of the average refrigerator distributor and that the

11 APPLICATIONS FOR DOLECO PATENTED VACUUM COLD PLATES

1. **Walk-in Coolers:** Maintain exceptionally low temperatures. Efficient, clean and sanitary.
2. **Display Cases and Counters:** Plate serves as shelf for products. Cooling from below.
3. **Beer Coolers:** For precoolers and boxes. Clean, sanitary. Requires little space.
4. **Milk Coolers:** Efficient. Require little cabinet space, allowing greater milk storage.
5. **Bottle Coolers:** Economy of space permits more bottles. Maintains even temperatures.
6. **Water Coolers:** Compact plates give more space for water. Slimes will not collect. No odors.
7. **Candy Cases:** Maintains proper temperatures. Very efficient. Very slight frost accumulation.
8. **Cheese and Butter:** Plates form shelves for product. Product in close contact with plates.
9. **Ice Cream Cabinets:** Standard conversion units available. Maintains low temperatures with high efficiency. Greater ice cream capacity in cabinet.
10. **Trucks:** Desired temperatures with Hold-Over Efficiency.
11. **Domestic Evaporators:** Standard 2, 3, 4, and 5 tray sizes. Enamel fronts and doors. Defrosting minimized. Efficient.

WRITE FOR BULLETIN P

DOLE
REFRIGERATING CO.
208 N. CLINTON STREET, CHICAGO

alert ones were beginning to realize the fact. With more than 7,000,000 mechanical refrigerators in use, there is bound to be a tremendous accessory and parts business. The distributor with a well established organization can cash in on many dollars' worth of business. It is going to come. In fact, it is right here now. Whenever the refrigerator distributor will set aside his dignity of being "an exclusive distributor of refrigerators only," he will sell kindred and allied merchandise which rightfully goes with the refrigerator.

Parts jobbers, and successful ones, are already commanding a large volume of business on refrigerator parts, accessories, and equipment of various kinds which are sold to the service man and in turn to the owners of refrigerators.

The service man is in an ideal position to secure additional profits. Coming into contacts every day with the users of domestic refrigerators, he can suggest certain accessories that will appeal to the housewife, especially if the accessories have a definite utility value.

* * *

ROME FROST FREE COMMERCIAL EVAPORATORS

BULLETIN No. 110, recently released by the Rome-Turney Radiator Co., Rome, N. Y., includes illustrations and data relative to the standard sizes, special sizes, capacity data and physical dimensions of Rome Frost Free Commercial Evaporators.

Rome evaporators are of the helical fin type construction. The coils are constructed of the best grade of refrigeration quality seamless copper tube which is equipped with a continuous helical copper fin, providing a good bond for the fin to the tube wall.

Service men are invited to send for this bulletin containing valuable information.

* * *

FRIGIDAIRE ANNOUNCES NEW PARTS POLICY

WIDENING of its national service facilities to the extent that refrigeration service dealers now may obtain Frigidaire manufactured replacement parts was announced recently by Frigidaire Corp.

PRACTICAL Recording Instruments

are the service man's best trouble shooters

Recording Thermometer $18

Operation Recorder $21

Dependable, strongly built, easy to use. Charts changed in ¼ minute. Gives 24 hour continuous record on 4 inch circular chart. Bakelite case, non-breakable face, rust proof parts, no chained parts. Nickel silver pen of open type, built into door so it swings out of way when changing charts. Write for descriptive folder.

Practical Instrument Co.
2721 N. Ashland
Chicago

Ask your jobber about
PRACTICAL INSTRUMENTS

Announcing
Scurlock Kontanerette Kits

We have a new merchandising plan which enables you to get more business and sell more refrigerators and build more good will. Let us tell you about it.

Scurlock Kontanerette Kits can be furnished by your Refrigerator Parts Jobbers many of whom advertise in this publication.

Ask for Sales Plan giving name of your jobber, and we will forward beautiful catalogue and full information. Address:

Scurlock Kontanerette Corporation
1477 Merchandise Mart, Refg. Dept., Chicago

through Virgil A. Hetzel, installation and service manager.

Following a trend developed in the automotive industry, Frigidaire will actively merchandise replacement parts through its national distributing organization to the thousands of refrigeration service dealers, many of whom were trained in the Frigidaire business and now own and operate their own service organizations, Mr. Hetzel said.

"After making allowances for obsolescence, there still remain over 3,000,000 Frigidaire installations throughout the United States," Mr. Hetzel said. "Many of these installations are serviced by specialty service dealers and reputable dealers of this type have insisted for so long that we permit them to use genuine Frigidaire parts that we have decided to make them available to those who adhere to the Frigidaire organization's standards of service and who have been trained in the servicing of Frigidaire parts.

"This new development will in no way affect our present dealer service organization, but will augment Frigidaire service to the extent that users who wish to patronize service dealers who have served them in the past now will be able to have genuine parts used in their units. It is our feeling that users will receive much longer service from their units if they are equipped with Frigidaire precision-built replacement parts."

* * *

INCREASED PRIME SURFACE AREA COILS BY STANDARD

THE Standard Galvanizing Co., Chicago, highly rated among coil manufacturers for many years and the only organization of its kind in the middle west maintaining a galvanizing department in direct conjunction with the manufacture of coils, has just announced the publication of their 1936 refrigeration coil catalog. Construction of the most modern design and lasting durability, greater ratio of prime surface to total surface, protective coatings, etc., are among the many valuable bits of information contained in this book.

A new over-night emergency service on steel coil orders placed as late as 5 P. M., made possible by "Standards"—under one roof production—system, should prove of

EXTRA DRY ESOTOO
VIRGINIA SMELTING
(Liquid Sulphur Dioxide)

Less than 0.0030% moisture!

Made by a special patented process, Extra Dry ESOTOO (liquid sulphur dioxide) comes to you with less than 0.0030% moisture. The name Extra Dry ESOTOO on the cylinder is your assurance that the refrigerant is pure, reliable, uniform, and dry as the highest technical skill and painstaking testing and control of each step in the manufacture can make it.

V-METH-L (Virginia methyl chloride), made by the makers of ESOTOO, is—like ESOTOO—shipped from 69 distributing points to insure prompt delivery to you.

Virginia Smelting Co.
West Norfolk **Virginia**

RSE-6-36

MAIL-TO-DAY

F. A. EUSTIS, Sec'y,
VIRGINIA SMELTING CO.,
131 State St., Boston, Mass.

Send me the literature I have checked. I am interested in receiving any additional literature on Electrical Refrigeration you may issue from time to time.

☐ Folder: Extra Dry ESOTOO (Liquid Sulphur Dioxide)
☐ Folder: V-METH-L (Virginia Methyl Chloride)
☐ Folder: Transferring from large to small cylinders
☐ Circular: Physical properties of various refrigerants

Name .....
Street & No. .....
City & State .....

great value to manufacturing users of coils.

Full tube area maintained throughout the refrigerant circuit by the use of return bends of "Standards" own design and manufacture—guaranteed to be crease-free and void of flat spots—is set forth as one of the inner secrets of their rating perfection.

Copy of this new catalog may be obtained by writing direct to the manufacturer.

STANDARD GALVANIZING CO. PLANT, CHICAGO

* * *

GOOD TOOLS—GOOD MECHANIC

IT is false economy to use a cheap tool. Cheap tools prove expensive at any time. A complete tool box of tools especially designed for the work to be done is a sure sign of a good mechanic.

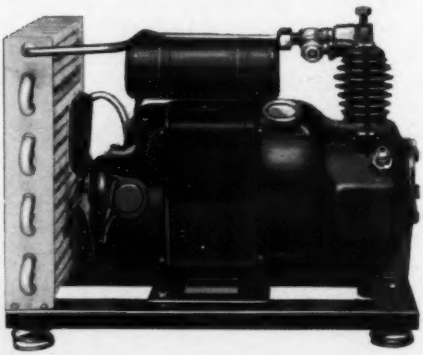
Refrigeration work is precision work, and the refrigeration service man often finds it necessary to have a wide range of tools to meet unforeseen conditions. Take for instance an old stand-by—the socket wrench. Such a wrench, designed especially for refrigeration service work, including ratchets and sockets to take care of practically every requirement of the service man, is made by the Bonney Forge & Tool Works, Allentown, Pa., and is packed in a substantial case that will withstand the handling such tools receive. Service tools are illustrated in this company's Bulletin CV43.

KELLOGG

MAKES A WONDERFUL REPLACEMENT JOB!

For replacement of units in any make of box, or for original installations, specify the new direct drive, light, compact, vibrationless KELLOGG Highsides. It offers more refrigeration for less current consumption—25% larger capacity than any belt-driven 1/6 H.P. condensing unit now on the market. It will neither load nor unload with variations of crank case pressure. It is compact in size and for special applications may be constructed as low as 8½" high. It is designed to solve all your replacement problems. It is not hermetically sealed. Commercial sizes from ¼ to 5 H.P. also available.

Write for your copy of the new KELLOGG catalog and price list before you place your next order for highsides.



Kellogg Compressor and Manufacturing Corporation

79 Humboldt St., Rochester, New York, U. S. A.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

All Space in General Exhibit for R.S.E.S. Convention Reserved

Additional Space to Be Provided for Late Exhibitors

AS this issue goes to press, all exhibit space in the general exhibit rooms for the R. S. E. S. convention at the Hotel Gayoso, Memphis, Tenn., November 11, 12 and 13, 1936, has been reserved.

The sell-out of all the space, with the convention some five months distant, is indicative of the interest and attendance which can be expected at this third annual meeting.

To accommodate other exhibitors who have delayed making their reservations, a limited number of additional spaces will be provided close to the general exhibit rooms as the hotel accommodations will permit.

The complete list of exhibitors who will be represented in the general exhibits at the convention are as follows:

Fedders Mfg. Co., Buffalo, N. Y.
Kellogg Compressor & Mfg. Corp., Rochester, N. Y.
Automatic Reclosing Circuit Breaker Co., Columbus, Ohio
Penn Electric Switch Co., Des Moines, Iowa
The Starr Co., Richmond, Ind.
Standard Refrigeration Parts Co., Chicago, Ill.
L. H. Gilmer Co., Philadelphia, Pa.
Peerless Ice Machine Co., Chicago, Ill.
Automatic Products Co., Milwaukee, Wis.
Ansul Chemical Co., Marinette, Wis.
Mills Novelty Co., Chicago, Ill.
Henry Valve Co., Chicago, Ill.
Airo Supply Co., Chicago, Ill.
Mueller Brass Co., Port Huron, Mich.
Virginia Smelting Co., West Norfolk, Va.
Wolverine Tube Co., Detroit, Mich.
Alco Valve Co., St. Louis, Mo.
Curtis Refrigerating Machine Co., St. Louis, Mo.
Frigidaire Corp., Dayton, Ohio
Detroit Lubricator Co., Detroit, Mich.
R. & H. Chemicals Department, Wilmington, Del.
Imperial Brass Mfg. Co., Chicago, Ill.
Tecumseh Products Co., Tecumseh, Mich.
Cutler-Hammer Co., Milwaukee, Wis.
Dole Refrigerating Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Perfection Refrigeration Parts Co., Harvey, Ill.
American Injector Co., Detroit, Mich.
Rotary Seal Co., Chicago, Ill.

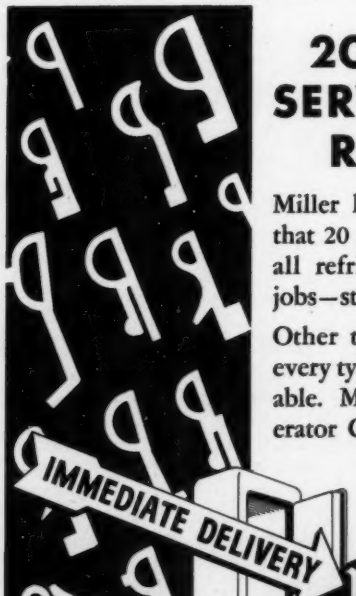
LADIES ENTERTAINMENT COMMITTEE MAKES PLANS FOR CONVENTION

THE Ladies Committee of the Memphis R. S. E. S. is looking forward with much anticipation to the National Convention to be held in our city on November 11 to 18, 1936.

We especially want to meet the wives, mothers, daughters, sisters, and friends of our fellow chapters. A complete program of entertainment has been arranged, thereby assuring the ladies an enjoyable time, with an abundance of Southern hospitality in evidence. The convention program has been arranged in such a manner that the ladies play a most important part. Their pledged attendance is an assurance of its success. The routine is arranged whereby you will meet those whom you do not know, and see those whom you have met at previous conventions.

The convention headquarters, Hotel Gayoso, is in itself an attraction. Many pages of history have been written within its walls. The late Teddy Roosevelt during his term

MEMPHIS LADIES CONVENTION COMMITTEE
Mrs. Geo. L. Uetz, Chairlady, Mrs. Blane Bridges, Mrs. Boyd Evans



20 GASKET TYPES SERVICE 80% OF ALL REFRIGERATORS

Miller has simplified rubber gaskets so that 20 styles will service 80 per cent of all refrigerators. For profitable repair jobs—stock these styles.

Other types and shapes for practically every type of unit manufactured are available. Make money with Miller Refrigerator Gaskets. *If you cannot secure them through your local jobber, write direct.* Miller Rubber Company, Inc., Akron, Ohio, U. S. A.

Miller

"ENGINEERS IN RUBBER"

Do You Believe in Insurance?

HERE'S HEALTH! Scientifically designed moulded mask and individual gas cartridges.

Then you believe in *protection*. This work of yours may at any time expose you to a dangerous concentration of gases. You need this

Refrigerator Servicemen's CESCO HEALTH GUARD FUME KIT

Light and easy to take along on every job. Gives protection against ammonia, sulphur dioxide and methyl chloride fumes in concentrations usually encountered in case of leaks. You can work until the leak is fixed. Mask needs adjusting only once and is comfortable to wear.

Write for complete details

Chicago Eye Shield Co.
2341 Warren Blvd., Chicago, Ill.

QUIET

V-Belts for

Refrigerators
Oil Burners
Beer Pumps
Water Pumps
Washing Machines
Woodworking Tools

FRACTIONAL horsepower belts in the three standard F. H. P. cross sections... 3/8", 1/2" and 21/32". The new catalog contains Gilmer sizes on complete listings of all refrigerators. Write for your catalog and the name of your Gilmer distributor.

L. H. GILMER CO., Tacony, Phila.

MAKERS OF THE WORLD'S BEST-KNOWN V-BELTS

1936 CATALOG *is now ready*

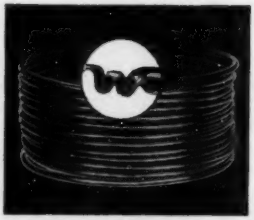
Gilmer BELTS

For Easier-Better Installations Use WOLVERINE COPPER TUBING

Wolverine Copper Refrigeration Tubing makes installations easier because it handles easier. The special bright annealing process produces an unusually soft, even temper that makes handling a pleasure. Bends go in smoothly and evenly—it is easy to cut or flare, and it may be threaded through walls, or over rafters with the least possible difficulty.

Wolverine Tubing makes installations better, because it is perfectly clean—uniform—dense—without the slightest sign of porosity.

Look for "Wolverine" stamped on every foot.



WOLVERINE TUBE CO.

SEAMLESS COPPER BRASS & ALUMINUM

DETROIT MICHIGAN

1411 Central Ave. Detroit

of presidency spoke from the mezzanine floor to a crowded audience. The elaborate murals on the walls tell the story of De Soto, the Indians, and the discovery of the Mississippi River at Memphis. Sara Bernhardt's candelabras and a handsome clock are also valuable collections of the hotel.

We want you to come and enjoy our city and participate in the National Convention.

The Ladies Auxiliary of the Memphis Chapter was especially formed for the pleasure of the ladies attending the parties, and affairs of entertainment that have placed under our supervision and we assure you of much happiness if you will attend.

Please accept this as our personal invitation to visit Memphis and partake of "Real Southern Hospitality."

THE LADIES COMMITTEE OF
MEMPHIS CHAPTER,
MRS. G. L. UETZ, *Chairlady.*

ADDITION TO OFFICERS FOR NIAGARA-FRONTIER CHAPTER

IN addition to the list of officers of the new Niagara-Frontier Chapter published in the May issue of THE REFRIGERATION SERVICE ENGINEER, due to the increased amount of work in the Secretary's office, Mr. Frederick H. Walker, 2271 Elmwood Avenue, Buffalo, has been added as corresponding secretary. Also, Mr. Joseph Askin, chief engineer of the Fedders Manufacturing Company, has been selected as Honorary Chairman of the Educational and Examining Board of the chapter.

INDIANAPOLIS CHAPTER RECEIVES ITS CHARTER

AT a meeting held on Monday evening, May 18, members and many guests gathered at the meeting hall provided by F. H. Langsenkamp Company for the purpose of receiving their charter from the National Society.

Temporary President Russell Duncan, in calling the meeting to order, stated that the purpose of this particular meeting was acceptance of the charter by Indianapolis Chapter, and called upon National Secretary H. T. McDermott, who expressed the pleasure of the National Society in welcoming

Indianapolis Chapter, and proceeded to obligate the members.

The names of thirty members appear on the charter as charter members, and with the start now made Indianapolis Chapter expects to add considerably to their membership rolls.

Inasmuch as the officers were elected before the receipt of the charter, they decided to hold another election on charter night so that all of the members—both old and new—might express their preference. The following officers were selected to serve for the current fiscal year:

President—Wm. L. Drake
First Vice-president—Russell Duncan
Second Vice-president—Ralph Duncan
Secretary—J. O. Cummings
Treasurer—J. A. Cassady
Sergeant-at-arms—David Gerrard

After this business had been disposed of the assembled members and guests were privileged to hear the talk of Mr. Dan D. Wile of the Detroit Lubricator Company, Detroit, Mich., who explained the operation, function, and gave actual servicing demonstrations on thermostatic expansion valves. Mr. K. B. Thorndike, western sales manager of the Detroit Lubricator Company, assisted Mr. Wile.

* * *

UNIFORM RATE BOOK ISSUED BY CLEVELAND CHAPTER

CLEVELAND Chapter has prepared for the use of its members a small, convenient, pocket-size book in which is suggested a minimum service charge for various service operations. To help defray the publication of this rate guide, it is sold to each member at a cost of $1.00 per copy. Members of other chapters may secure this guide at the same price.

The foreword to the directory explains the purpose of its publication. Among other things, it states as follows:

"All prices in this book are effective immediately and are minimum charges. Material and workmanship may require additional charge on some of these prices. All parts guaranteed for one year or ninety days according to the manufacturer's guarantee. Labor is guaranteed for thirty days only. If customer does not consent to the replacement of parts on the first

call no allowance should be made if parts are replaced at a later late. All machines must be thoroughly checked and customer advised of all defects other than the parts that you repair or replace. If 'call back' is not the fault of previous service a second service charge should be collected. No guarantee can be given on motor work done on the premises."

RECEIPT BOOK SUGGESTED IN UNIFORM COST ACCOUNTING SYSTEM

By HARRY DROWNES, Chicago
Member National Cost Accounting Committee

IN the previous article covering *Service Orders* a suggestion was made that the duplicate service form could be used as an invoice to be given to the customer immediately upon completion of a job.

This system is not recommended because in practice the operation becomes cumbersome. It necessitates carrying a large sheet of carbon paper to make the duplicate, and moreover it gives information to the customer, which we believe is superfluous. Too much information on a service order, when in the hands of a customer, tends to enlighten the customer to the extent that future service calls would be handled by the customer himself.

Instead we recommend carrying a book of receipts as illustrated on Page 56, the original receipt being given to the customer and the duplicate receipt being attached to the service order as a permanent record.

The features of this receipt form are as follows:

(a) Establishes the authority of the serviceman to collect.
(b) Serves as an invoice, as it shows the work done and the amount collected.
(c) Acts as a hedge against call backs, by showing plainly that no orders under $5.00 carry any kind of a guarantee and all other orders, guarantee only the particular operation covered by the service call.

The presentation of these forms, which are appearing in consecutive issues of this journal, have a two-fold purpose, viz., to secure these forms through the Society at a minimum cost and in minimum quantities, and further as a step towards standardization procedures throughout the country.

As a suggestion towards standardization, it is suggested that no guarantees be in excess of 90 days, regardless of the guarantees set on the individual parts by the manufacturer. Thus a cold control could be guaranteed by the manufacturer for a period of one year. Regardless of the fact that the serviceman can replace this cold control free of charge if it proves defective within the year's period, this advantage should not be passed on to the customer.

When a guarantee is made on the operation of the entire unit, we begin to enter the field of *insurance* and for this kind of guarantee a regular *premium* should be charged. This *premium* has no bearing on service rendered, and should be levied in the same manner that a *life insurance premium* is levied. Life insurance is granted on healthy lives only, likewise insurance on refrigerating units should be granted only on units in good condition. It is not the purpose of this article to go into annual *premium* ar-

Standard Water Cooled Condensers

New—Repaired—Exchanged

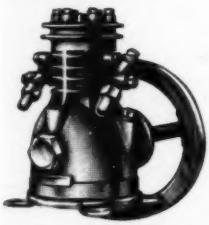
New Replacements for Frigidaire Model N $19.00
For Model C $26.00

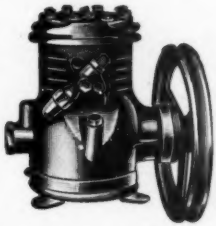
Model N Frigidaire Condenser Repaired or Exchanged $10.00
Model C $15.00

Send for our new bulletin, just issued, illustrating
Standard Evaporators—Condensers—Fin Coils

Standard Refrigeration Parts Co.
5101 W. Madison St. • Chicago, Ill.

"Chieftain" Quality Built Compressors and Condensing Units





See Your Jobber

For Literature and Prices on Our Complete Line

Save money by installing "Chieftain" Compressors instead of trying to satisfy exacting customers with rebuilt compressors or condensing units.

"Chieftain" Compressors are made to last. Precision limits are maintained on all parts. Our new and exclusive lubrication system insures longer life and higher efficiency, as well as a quiet operating unit.

In addition to quality we offer prices that will permit you to make a higher percentage of profit as well as a saving of time, which will enable you to satisfactorily handle a larger volume of business.

TECUMSEH PRODUCTS COMPANY, Tecumseh, Michigan

Refrigeration Division

SERVICE DOESN'T FALTER WHEN IT COMES FROM HARRY ALTER

WHOLESALE ONLY

WHEN THE TEMPERATURE SOARS—
DEPEND ON US FOR FAST SERVICE

REFRIGERATION
PARTS and SUPPLIES

WRITE FOR CATALOG

SEND FOR OUR *New* CATALOG

If you are engaged in the business of servicing or selling refrigeration you should have a copy of our new 96 page SUMMER catalog. Write today on your letterhead. We sell to the trade only.

COMPLETE STOCK Carried in Our BRANCH HOUSES

The HARRY ALTER CO., Inc.

MAIN OFFICES 1728 S. Michigan Ave., CHICAGO, ILL.

NEW YORK CITY	CLEVELAND, OHIO	ST. LOUIS, MO.
161 Grand St.	4506 Prospect Ave.	2315 Washington Ave.

rangements to service units, but the thought is advanced merely as a reminder that no guarantees should be given in excess of 90 days unless an extra *premium* is charged.

Service No._____
Name_____
Address_____
Amount Collected_____

Phone Garfield 6900

Smith Service Company
1900 Bank St.

SERVICE ORDER NO. .....
Date .....

RECEIVED FROM .....
Payment must be made to Serviceman on completion of job. ..... $.....

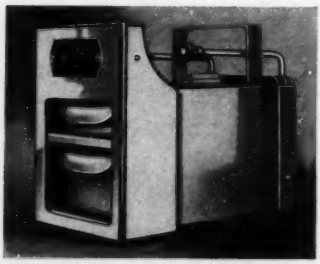
WORK DONE .....

GUARANTEE .....
Guarantees apply only to the individual parts repaired or replaced, and do not automatically cover the entire unit. Minor adjustments involving an expense of $5.00 or less, carry no guarantee.

SMITH SERVICE CO.
Per_____

DROWNES SERVICE FORMS NO. 2
Reduced form of Receipt. Actual size is about 6½x2½ inches with perforated Stub. Made up in books of 50 each, originals and duplicates.

The NEW "HUMIDI-PACK" EVAPORATOR by PEERLESS



A "1936" line of Household Evaporators with "1936" sales points.

1. **High Box Humidity**
2. **Fast Ice Cube Freezing**
3. **Clean design—Smooth exterior**
4. **Reasonable prices**
5. **"Humidi-pack" is the Power-Pack of Refrigeration**

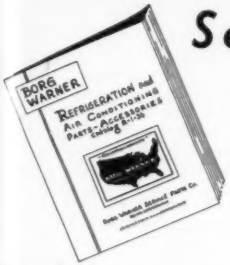
PEERLESS ICE MACHINE CO.
CHICAGO — TWO FACTORIES — NEW YORK
515 W. 35th St. — 43-00 36th St., L.I.C.
Representatives in all principal cities.

Cash In ON FILTERPURE

- Installed in a minute's time in counter cases and reach-in boxes.
- Lowers temperature 8 to 12 degrees.
- Stops sweating.
- No taste transfer. You can place fish next to meat in absolute safety.
- Maintains color and firmness of meats.
- Uniform temperature and humidity.
- Retails for $26.50.

Filterpure is the fastest selling article ever introduced in the refrigeration field. It is the "missing link" to 100% refrigeration. See your Jobber today.

BETZ CORPORATION BETZ BUILDING Hammond, Ind.



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Free for the Asking

Stocks Always Complete
Shipments Prompt
Full Cooperation

Your time and money saving guide to DEPENDABLE PARTS and ACCESSORIES for all makes of Refrigerators and Air Conditioning Units.

Every part and accessory has the backing of Borg-Warner's world wide reputation for uniform high quality, dependability and accuracy.

BORG WARNER SERVICE PARTS CO.
DIVISION BORG-WARNER CORPORATION
2100 Indiana Avenue, Chicago, Ill.

for Dependable SERVICE WORK use *Artic*
REG. U.S. PAT. OFF.
(DU PONT METHYL CHLORIDE)

The *original* methyl chloride, standard since 1920. Lowest moisture, lowest acidity and uniform purity guaranteed. Prompt deliveries from 53 authorized stocking points. Send for ARTIC Service Manual and ARTIC Service News—convenient information about handling and servicing methyl chloride, distribution points, etc.

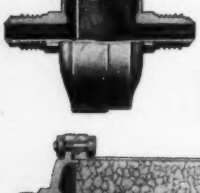
DU PONT

The R. & H. Chemicals Department
E. I. DU PONT DE NEMOURS & CO., INC.
Wilmington, Delaware

District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

ONLY HENRY
Makes the Most Complete Line
HENRY VALVE CO.
TRADE MARK

Write for New Catalog 51: Strainers, Dryers, Line Valves and Service Tools



TYPE 890 SMALL STRAINER

With cup-shaped screen having 50% more capacity than usual flat disc. Soldered copper shell.

FLANGED SHELL
Dehydrator With Dispersion Tube

Less pressure drop. More efficient. Easier to refill. Copper shell. Forged steel distortion-proof flange. Tongue-and-groove, recessed-gasket joint. Shell diameters: 2" to 4⅛" Dehydrant capacity: 13.5 to 230 cu. in. Flare or union solder type fittings.

"Y" STRAINER
For Copper Pipe

Exceptional design. Negligible pressure drop. Accessible clean-out flange. Large screen area. Light weight. Baffle prevents injury to screen. Oil trapping prevented by installing on side or in vertical position. Liquid lines: 80 mesh. Suction lines: 50 mesh.

SOLD BY ALL LEADING JOBBERS

Henry Valve Co.
1005-19 N. Spaulding Ave., Chicago, Ill.

CHICAGO CHAPTER

Meeting of May 12, 1936

By H. D. BUSBY, *Secretary*
5611 Lawrence Ave., Chicago, Ill.

THERE being no business for the evening, the meeting was immediately turned over to Mr. Hendrickson, who introduced Mr. T. J. Tweed of the Dole Refrigerating Company, who gave a very interesting talk on Dole plates and evaporators.

Following this talk Mr. H. W. Kleist, Engineer of the Dole Company, was called upon to answer questions and give some technical information on the coils.

Mr. W. Mills suggests that, since the bond and licensing laws are being pushed quite rapidly at present, we should appoint a committee to represent our Chapter in this matter and procure information and a representation at the City Council hearing.

\$ \$ \$

PITTSBURGH CHAPTER

Meeting of May 11, 1936

By F. V. GOLITZ, *Secretary*
1518 Davis Ave., Pittsburgh, Pa.

THE regular meeting of Pittsburgh Chapter was held at the Roosevelt Hotel on May 11, President C. O. McCauley presiding, with approximately sixty members and friends present.

The Cost Committee reported progress on a minimum price schedule. The attention of the members was called to the cooperative advertising methods used by other chapters in the phone book and newspapers. This was discussed and will be taken up at the next meeting for action.

The speaker of the evening, Mr. D. D. Wile, was introduced by Mr. McCauley, whose subject was, "Thermostatic Expansion Valves." Mr. Wile covered his subject thoroughly and answered the many questions asked. His lecture was illustrated with chalk drawings and charts and was interesting and instructive throughout. A vote of thanks was given Mr. Wile and the Detroit Lubricator Corporation for making this lecture possible.

The meeting was adjourned to allow the members and guests to partake of lunch and refreshments. This part of the program was in the nature of a celebration of the First Anniversary of Pittsburgh Chapter. From the comments, we feel that the party was a success and that it will be repeated soon.

"THE 'CONTRIBS' COLYUM"

By THE KINGFISH

WELL, finally the snow melted away from around the refrigerator, and we begin to see a little activity in the service business again and that sets us thinking again of making a little money once more. You know with automobile licenses, insurance, income tax, coal, etc., it has been a sort of a strain on the bank account and, oh yes, we almost forgot the R.S.E.S. dues—well, we received our 1936 card and certificate and are all set now. By the way, did you receive yours? If not, you'd better hurry and see your chapter treasurer or you may miss some issues of the magazine as well as the lecture course.

Say, are we proud of our Certificate of Proficiency! Oh boy! We are having it framed and it will occupy a prominent position in our den. We are wondering how many members have this certificate. It is very attractive and will be valuable one of these days when things open up for good. Better get lined up for the examination now.

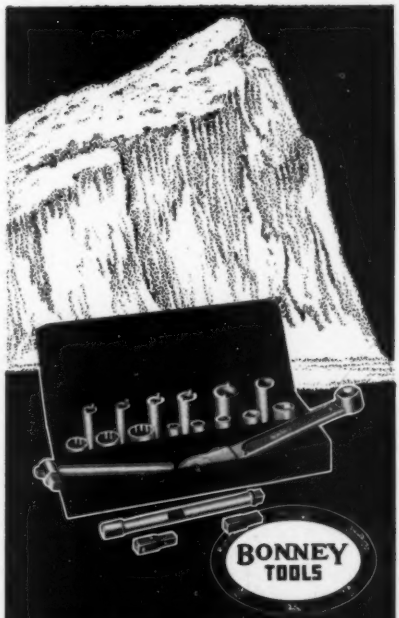
So, our dear friend Mr. Euth has become president of Detroit Chapter. Well, that is a pleasure. Hello, Bill, and may your chapter grow under the watchful eye of "the great spirit."

Our "better half" still claims that we should have conventions more often. She says it is too long to wait until next November. But now that we were to the Chicago party she is contented for a while.

Good Thought of the Month

"It is not always what one knows that counts, but using wisely what one does know."

Memorial Day and Sunday we spent a restful and extremely pleasant couple of days on a farm in the country. We looked at the cows, the pigs and the chickens, and enjoyed the rare pleasure of not being called upon to fix someone's refrigerator. But, of course, we had to find out what people in the country do when their ice machine breaks down, so we visited a couple of stores in a small town nearby. One, a grocery store, had a refrigerator which was not operating because there was a dent in the brine tank. There was no one around there who could fix it. The nearest town from which they know they could get service is sixty miles away. The other one was a drug store, with a soda fountain and ice cream cabinet. Here the ice cream company takes care of the machine, but is about seventy miles away. His machine runs all the time, because he is afraid when it shuts off that it will not start again due to faulty adjustment. There are quite a few refrigerators in homes and stores around this community and it seems strange that no service man ever finds his way in there. Sounded like there might be some business at that point.



STRENGTH

STRENGTH is as important in the tools you use for refrigeration service as in the mechanism of the refrigerators themselves.

Bonney Tools are known the world over for their strength. When tools are needed, buy Bonney—and be assured of getting the right tool for the job, built to give years of service.

For complete information on Bonney Refrigeration Tools write for Bulletin CV43 or see your nearest jobber.

BONNEY
Forge and Tool Works
Dept. R
Allentown, Pa.

MEMBER REFRIGERATION PARTS & SUPPLY MFRS. ASSN.

SERVICE ON APARTMENT HOUSE MULTIPLE SYSTEMS

(Continued from Page 31)

Remedy. (a) Remove evaporator from system, empty out the oil and replace and adjust the float valve for proper operating level in the evaporator. (b) A temporary remedy sometimes quite effective is to heat evaporator by means of a small torch or by putting hot water in ice cube trays. This causes a violent bubbling in refrigerant-laden oil, causing part of the oil to return to the compressor. (c) For insurance against continuance of the oil bound floats, install an effective oil trap in the high pressure vapor line between the compressor and the condenser of the condensing unit.

Cause D. Moisture in refrigerant, causing freeze up in pressure reducing valve.

Remedy. Install suitable drier in liquid line of the refrigerating system.

Cause E. Improperly adjusted thermostatic expansion valve allowing only part of the evaporator to work.

Remedy. Adjust thermostatic expansion valve to feed refrigerant into more of the evaporator coil.

SERVICE CALL NO. 8
Refrigerators Too Cold

Cause A. Improper control adjustment.

Remedy. Reset control by gages.

Cause B. Insufficient refrigerant, causing machine to operate continuously.

Remedy. Add refrigerant.

Cause C. Compressor capacity slightly low so that machine will not shut off.

Remedy. Increase compressor capacity if possible by seeing that piston and head valves are operating properly when the compressor is turning up to speed. If this will not take care of the trouble, the control may be adjusted to compensate for the low capacity.

Cause D. Machine runs continuously due to defective control or motor relay.

Remedy. Locate trouble and repair.

SERVICE CALL NO. 9
Noise in Building Due to Refrigerating Machine

Cause A. Noisy motor may be due to dry or loose bearings or defective motor.

Remedy. Oil motor or have it repaired by motor repair shop.

Cause B. Motor pulley loose on shaft.

Remedy. Reset motor pulley on shaft.

Cause C. Compressor flywheel loose on shaft.

Remedy. Reset flywheel on shaft.

Cause D. Belt squeak.

Remedy. Apply belt dressing to sides of belt, or replace cut belt with moulded belt.

Cause E. Belt slapping due to loose ends on belt or due to layers of belt becoming separated.

Remedy. Replace belt.

Cause F. The compressor knocks.

Remedy. Add oil to compressor. If this is ineffective, repair compressor in shop.

Cause G. Tubes rattling against each other or pipes in building.

Remedy. Locate vibrating tubes and secure them with tape or other fastening devices.

Cause H. Water hammer in pipes.

Remedy. Install an air cushion chamber in water line, repair or replace water valve.

Cause I. Striking of fan or other rotating part of machine against another part of the machine.

Remedy. Locate noise and make proper repairs.

Cause J. Relay telegraphs.

Remedy. Locate poor control contact or loose wire causing intermittent current to relay coil and repair.

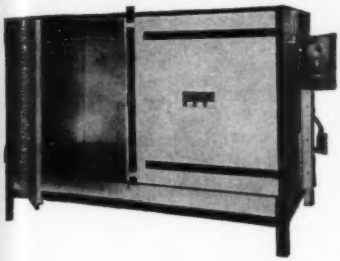
Cause K. Relay hums loudly.

Remedy. Investigate shading coil around core of holding coil. Repair opening in shading coil.

NEW STANDARD BULLETIN

A NEW bulletin has just been released by the Standard Refrigeration Parts Company of Chicago. This new bulletin shows an increase in the variety of domestic evaporators, water-cooled condensers, and commercial fin coils of their own manufacture. Of particular interest to service organizations is the repair department for water-cooled condensers, brine tanks, and other "hard to repair" refrigeration appliances. A stock of the most popular condenser-receivers are always carried in stock for exchange purposes. This firm has inaugurated a new policy of prepaying freight one way on repair or exchange orders.

A practical low-priced oven



For Refrigeration Service Shops and Distributors . . .

Here is the oven you service men and refrigerator distributors really want—an oven that is practical for the service shop and a standard oven that is really low priced.

Put a Despatch Type C Oven in your service shop. Use it for dehydrating your refrigerator units. Marvel at the uniform and positive results you get in such a short time and with such low costs.

Then use it for baking and drying your finishes. It will do a fine job and your customers will certainly be pleased too.

Now use it for baking and drying insulating varnishes on coils and armatures, and for other odd jobs that always come up around the service shop.

Despatch Type C Ovens are general utility ovens and that makes them of such outstanding value to any distributor and service man.

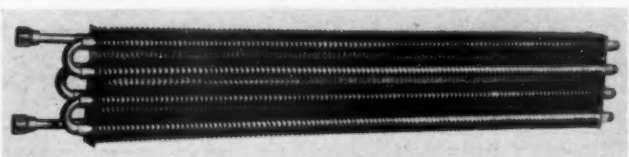
And the prices are the lowest for a standard service station oven. Equipped with gas or electric heating systems, and made in every size to meet individual requirements, these ovens range in price from $48.00 up. Prices asked for these ovens only represent a fraction of their real worth. Standard ovens can be shipped immediately from stock.

WRITE TODAY for bulletin illustrating these ovens and outlining the remarkable low prices. Tell us about your problem too—Despatch can help you.

DESPATCH OVEN CO.

632 Ninth St., S. E. **Minneapolis, Minn.**

ROME *Announces*



A new bulletin 110 covering ROME FROST FREE EVAPORATORS

These compact Rome Coils can be used in many places where ordinary coils will not fit. SEND FOR YOUR COPY.

ROME WATER COOLED CONDENSERS of "tube within a tube" type are making money for service men who have opportunity of changing over inefficient air cooled installations.

ROME-TURNEY RADIATOR CO.

300 South James St. **ROME, N. Y.**

Makers of air heating and air cooling equipment. New air cooling bulletin now ready.

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BOOK REVIEW

Oil Heating Handbook. By Han A. Kunitz. Published by J. B. Lippincott Co., Philadelphia. 456 pages. 5x7½ inches. Price $3.50. For sale by Nickerson & Collins Co., 438 N. Waller Ave., Chicago, Ill.

OIL Heating Handbook is a volume which answers every question the home owner asks about oil heating, explains thoroughly and impartially the principles, installation and maintenance of oil burners, and provides students and oil burner men with simple, concise definitions of every word used in connection with heating engineering.

Starting off with a short introductory chapter and a description of a typical oil burner installation, the book divides into four main divisions called parts, part two dealing with fuels and combustion, followed by part three dealing specifically with heat.

Send a Picture and Win a Prize

THE editors are looking for pictures for publication either on the cover or in connection with articles. Pictures of installations—a shop picture, or any other picture of unusual interest showing applications of refrigeration will be accepted.

All contestants whose pictures are accepted for publication will receive a copy of the new book just published on "Commercial Refrigeration." Send your pictures today.

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PARTS · TOOLS · SUPPLIES
LARGEST STOCKS · WIDEST SELECTION · FASTEST SERVICE
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H. CHANNON CO.
CHICAGO

RIGHT DOWN THE LINE

NEW C-H Replacement Control Has— EVERY FEATURE YOU WANT

The famous Cutler-Hammer Control, time-tested on a million refrigerators . . . is now available as a replacement unit.

Here are a few reasons for its popularity: Sure protection to motor, wide-range cold control, modern appearance, proved performance.

And here are Service Facts for the Service Man: 4 MODELS FIT NEARLY EVERY BOX. With two temperature models in 24" and 48" tubes or two pressure models for sulphur dioxide and methyl chloride systems—you're equipped to service 99% of the boxes in your community . . . with smaller stock, less money tied up, faster turnover, bigger returns, no shelf losses.

EASIER TO INSTALL; EASIER TO ADJUST. Unit mounts either horizontal or vertical, just two screws to insert. Differential and range adjustment made easily.

Every day more of the millions of old refrigerators move into the zone where they need repairs. With C-H Control that fits 99% of these boxes, that provides every advantage, it is easy to get the customer's O. K. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1363 St. Paul Avenue, Milwaukee, Wisconsin.

Send **NOW**

For full facts on this profitable item. FREE Booklet gives all information, diagrams, etc., also Replacement Control for popular-make Beverage Coolers and Ice Cream Cabinets. Some simple, reliable, proven mechanism. Call on your nearest jobber for stock.

CUTLER-HAMMER

REFRIGERATION CONTROL FOR REPLACEMENT SERVICE

Now Ready
Melco Refrigeration Catalog No. 6

Most complete issue ever published. For immediate delivery of essential supplies use our nearest warehouse. Large and complete stocks carried at the following points:

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Race 5454

2108 N. Elizabeth St.
Harrisburg, Pa.
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400 East Lombard St.
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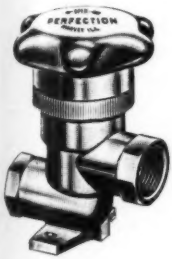
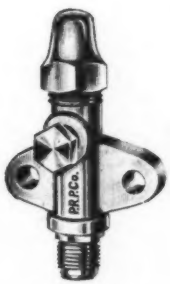
QUALITY
VALVES AND FITTINGS



IN keeping with our expansion program to meet the needs of the trade, Perfection now offers a very complete line of Refrigeration Valves and Fittings.

Rugged construction of highest quality materials enables these quality products to withstand even the most unusually severe usage.

Valve Bodies are made of forged brass having grain structure that prevents seepage of refrigerant... Stems are corrosion proof . . . Openings are designed for minimum of restrictions . . . Recognizing the importance of leak-proof joints, threads and seats are as near perfect as possible.



Valve threads are fitted with internally seated brass protecting caps—and cardboard sleeves are put on fittings to assure protection while in transit.

All these parts are subjected to rigid inspection, are put up in attractive packages, and carry the regular Perfection guarantee.

●

PERFECTION REFRIGERATION PARTS CO.

(A division of Perfection Gear Co., Est. 1919)

HARVEY, ILLINOIS

MINNEAPOLIS
HONEYWELL
CONTROLS

Meet Every Need

OF REFRIGERATION OR AIR CONDITIONING

THERE is a Minneapolis-Honeywell control for every refrigeration or air conditioning need, specifically designed for its particular function as a component part of the control system which will best fill the requirements of any job . . . When you specify Minneapolis-Honeywell, you can be sure each individual control is suited to its job, rather than being an adaptation of a control for some other application . . . The Minneapolis-Honeywell Engineer is always available for consultation on any problem pertaining to refrigeration, comfort cooling or complete air conditioning. Minneapolis-Honeywell Regulator Co., 2934 4th Ave. So., Minneapolis.

MINNEAPOLIS HONEYWELL

Control Systems

BROWN INSTRUMENTS FOR INDICATING, RECORDING AND CONTROLLING